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ABSTRACT

Data for this study were gathered from primary sources (interviews, government records, minutes of meetings, correspondence, and tapes of programs), as well as secondary sources including the two reports "The Action Study of Educational Uses of Satellite Communications in Remote Alaskan Villages" and "The Educational Satellite Communications Demonstration." The former experiment used radio via Applied Technology Satellite One, while the latter used television via Applied Technology Satellite Six. These experiments were successful in broadcasting programs, both commercially made and self-produced, into selected Alaskan villages and cities at 40 test sites. Unique features included low-cost earth stations, audience interaction, consumer committees, utilization aides, and four-language channels. The possible effects of satellite communications upon current Alaskan educational problems such as the bilingual and multicultural aspects, need for early childhood education, the change from boarding high schools to small rural ones, the reorganization of the State Operated School System into independent school districts, and the need for adult higher education and vocational training, were explored. Results indicated such major findings as (1) satellites were an effective method of furthering education in Alaska including rural areas, (2) certain educational services could be delivered to rural Alaska only by means of satellites, (3) viewer input was advantageous in program selection, (4) government and nongovernment agencies cooperated effectively in planning and producing programs, and (5) regional networks were needed to supplement the statewide capacity in order to accommodate and sustain the multi-ethnic feature of the Alaskan population. (Author/CHV)

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A HISTORY OF ALASKA'S INVOLVEMENT
IN EDUCATION VIA SATELLITE

1970 - 1975

by

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A Dissertation Submitted in Partial Fulfillment of
The Requirements for the Degree of
Doctor of Philosophy

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April, 1978

The purpose of this study was to provide a history of Alaska's involvement in education via satellite from 1970 through 1975. During this time two experiments were conducted: "The Action Study of Educational Uses of Satellite Communications in Remote Alaskan Villages" using radio via Applied Technology Satellite One, and "The Educational Satellite Communications Demonstration" using television via Applied Technology Satellite Six. The experiments were successful in broadcasting programs, both commercially made and self-produced, into selected Alaskan villages. Unique features included low-cost earth stations, interaction, consumer committees, utilization aides, and four-language channels.

Also researched were the reasons Alaska was chosen for the experiments, the technological background which made them possible, the chronology of major events, costs and funding problems, methods of evaluation, and the implications of satellite communications upon the educational, sociological, and economical facets of rural Alaskan life. The possible effects of satellite communications upon current Alaskan educational problems such as the bi-lingual and multi-cultural aspects, need for early childhood education, the change from boarding highschools to small rural ones, the reorganization of the State Operated School System into independent school districts, and the need for adult higher education and vocational training, were explored.

It was found that:

1. Satellites were an effective method of furthering education in Alaska.
2. Certain educational services could be delivered to rural Alaska only by means of satellites.

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3. Technologically, satellites could reach all areas of the state; however, these experiments were limited to about 40 sites.
4. Satellites were a cost-effective means of furthering education in rural areas.
5. Viewer input was advantageous in program selection.
6. Desirability of viewer response (interaction) depended on the type of program to be presented.
7. Government and non-government agencies cooperated effectively in planning and producing programs.
8. In order to accommodate and sustain the multi-ethnic feature of the Alaskan population, regional networks were needed to supplement the statewide capacity.
9. The State of Alaska should make every attempt to continue and expand the educational uses of satellites.

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CHAPTER ONE

INTRODUCTION

Purpose

The purpose of this study was to provide a history of Alaska's involvement in education via satellite from 1970 through 1975. To fulfill this purpose, data gathered from primary sources (interviews, government records, minutes of meetings, correspondence, and tapes of programs), and from secondary sources (books, reports and studies), was organized to show the chronological development of satellite educational broadcasting in Alaska, and analyzed to see what educational, sociological, ethnical, technical and financial aspects were involved.

Background

The space age with its satellites was a relatively recent development. Twenty years ago the world's first satellite was launched into orbit - Sputnik I, October 1957. Satellites have been used for communication purposes only a little over a decade - in 1965 the National Aeronautics and Space Administration (NASA) launched the world's first commercial communications satellite. The first experimental use of satellites for educational purposes occurred via the Applied Technology Satellite One (ATS-1) on January 4, 1970.

Within this relatively short time span the technological revolution has made possible a global system of communication satellites

which spanned the entire earth; satellites were stationed over the Atlantic, Pacific, and Indian Oceans; almost one hundred earth stations in sixty countries were in operation; instantaneous global communication was possible; remote, isolated areas received broadcasts as readily as metropolitan areas; and access to computer networks was feasible.

The impact for education of such technological advances was tremendous. This was especially true in Alaska, whose relatively small population lived in the largest state, separated from the rest of the nation, and often in small villages with no road access to each other.

Prior to the advent of satellites, television programs in Alaska's larger cities were broadcast days or weeks later than in the rest of the nation. The University of Alaska had to wait several weeks to get books by mail for information they could retrieve almost immediately via satellite computer connections. The youth of many small villages had to leave home to attend High School or College, an experience for which satellite television could have better prepared them. Teachers in rural communities had little opportunity to plan together, or to assist each other, or to receive additional training, except during in-service at the University or by attending conventions, both of which involved costly, time-consuming travel. Instructional programs at the elementary level were often hampered by not receiving films or other materials when requested. Pre-school children did not have the readiness activities supplied by such programs as Sesame Street. Adults lacked current information on vocational opportunities, the Native Land Claims, health programs. This was not to imply that satellite communications would be the panacea for all education ills, nor that the

educational needs of the people of Alaska were not being met, but merely to suggest that communication satellites offered a potential for meeting these needs to an even greater extent.

Because Alaska was in a unique position to benefit from satellite communications, this state was included in some of the experimental educational programs. Two of the Application Technology Satellites were available for use in Alaska: the ATS-1 using voice only facilities and the ATS-6 with visual as well as auditory capabilities. The ATS-1 was for projects such as the Action Study, Pan Pacific Education and Communication Experiment by Satellite, and Teaching Techniques for Rural Alaska, while the ATS-6 was used mainly for the Educational Satellite Communication Demonstration. A recent decision of Nasa to phase out of the communications satellite development has left Alaska to provide her own satellite for educational purposes.

The experimental phase of education via satellite in Alaska had been concluded. Alaska was on the threshold of moving from experimentation into planned, regular broadcasting.

Statement of the Problem

Since one group of experiments in education via satellites in Alaska has just concluded, and since the state is now in the beginning planning stages for regular educational programs via commercial satellite, this is a strategically appropriate time to provide a unified study of the various projects previously undertaken. Legislators will be asked to provide funding; educators and media specialists will be asked to provide programming (software); technicians will be asked to expand

and refine equipment (hardware); state school board members will be asked to provide guidelines and policies; and community aides will be asked to advertise and promote the programs in their villages. All need to have background information readily available on which to base sound decisions.

To help provide such background information the following questions were considered in this dissertation:

1. What factors were significant in causing the inclusion of Alaska in educational experimentation via satellite?
2. What was the chronology of the main events?
3. With what programs has Alaska been involved in this period?
4. How has satellite communication been used for educational purposes other than broadcasting of specific programs?
5. How effective have the broadcasts been (how evaluated)?
6. How were the experiments funded?
7. What technological problems and advances were encountered?
8. What are some implications for future continuation and development?

In searching the literature and in conferring with many people who have been involved with education via satellite in Alaska, it has become increasingly apparent that, although there have been studies made of individual programs, or parts of programs, there is no published history which encompasses the entire experimental period of such broadcasting in Alaska. It was also apparent that some studies involved broad geographical areas and there was a need to zero in on those aspects relative to Alaska alone.

Hypotheses

Historical studies do not necessarily include hypotheses, and when they are used they are not usually tested statistically. Rather, the historian endeavors to find out whether certain events happened, whether certain conditions existed, or what results could be attributed to these events. In the process of this research, the author endeavored to ascertain whether the following did indeed happen, or to what extent the following situations prevailed:

1. Education in Alaska was furthered by communication satellites. That is, education did result from the use of this technology in Alaska.
2. Technological refinements were made to enable all areas of the state to receive the broadcasts.
3. The benefits were worth the expenditures. That is that satellite communications was a cost-effective means of distributing education in Alaska.
4. Viewer input was advantageous in program selection.
5. Viewer response via satellite, also called interaction, was a desirable feature.
6. Government agencies and non-government agencies cooperated effectively in planning and producing programs.
7. A state with multi-ethnic background did find suitable commonalities for a statewide education via satellite system.

Definitions

Education is the change in attitude, behavior or thought resulting from external stimuli. In a broad sense, any type of communication could provide the stimulus for change, but for the purposes of

this paper, education was considered as those changes which resulted from programs conceived with the definite purpose of producing the change. For example, the showing of Alice in Wonderland by a commercial outlet for entertainment would not be considered as education, whereas the showing of the same program under the auspices of the Department of Education as a part of a literature class would be so considered. Education aimed at various age groups was included, be it pre-school, elementary, high school or adult.

Satellite is any smaller body rotating around a larger one, such as our moon rotating around our earth. For the purposes of this paper, however, the term was used to refer to artificial, man-made bodies launched into orbit for the express purposes of communication, either by radio or television.

Application Technology Satellites (ATS) are a series of United States Government owned satellites launched and controlled by the National Aeronautics and Space Administration (NASA) for public service broadcasts and experimentation. Two of these, ATS-1 and ATS-6, have been used in the Alaska experiments. In the literature they were also listed as ATS-I and ATS-VI; before being launched these were called the ATS-A and ATS-F.

A list of abbreviations and acronyms used in this dissertation is found in Appendix I.

Limitations

The study was limited geographically to the State of Alaska, except where inclusion of materials about other states or countries would have a direct bearing on education via satellite in Alaska.

The time span on which the study focused was the period from 1970 through 1975, from the beginning of educational broadcasting via satellite in Alaska until the ATS-6 was moved into a position over India. However, some information re earlier planning was included for background purposes, while some recommendations for the future were a natural follow-up.

This report excluded commercial broadcasting although some of this may have been educational in nature, and focused on those programs and experiments conducted by or for the government, both state and national.

The technological aspects were limited to those which would give a layman an understanding of the workings of satellites, including some of the problems in their uses in Alaska. This study was not intended to be a manual for radio-television-satellite operations technicians, but rather the emphasis was placed on the educational implications of satellite technology.

Importance of the Study

This dissertation was significant on several grounds. The universal and current nature of satellite broadcasting involved the very basis of education, namely, communication. Without communication there can be little education; a study of a tool to improve communication therefore had universal importance.

Education via satellite was proposed for other countries. A study of the problems and successes of programming in Alaska will be of value to other countries planning educational broadcasting. Furthermore, the technological refinements that were made during the Alaska

experiments can be utilized by others.

This dissertation made a contribution to the field of sociology inasmuch as it was a study of multi-cultural cooperation and problems. The response of Caucasians, Indians, Eskimos and Aleuts to satellite broadcasting came under the scope of the research.

For the State of Alaska this discourse was meaningful in that it provided in one study the history of satellite development in the state, together with an assessment of the advantages and disadvantages thereof. Especially was this significant since plans were just beginning to be formulated for further educational television via satellite as soon as satellite time could be arranged.

There were certain trends in Alaskan education in the 1970's upon which satellite communication acted as a catalyst. Among these were the expansion of community colleges into smaller towns, the beginning of the Land Claims College, the Alaska Native Bilingual Program, the establishment of high schools in some smaller villages, and the reorganization of the Bureau of Indian Affairs and the State Operated School Systems into Independent School Districts with their own school boards. This dissertation was significant in that it showed the relationship between satellite broadcasting and such current trends.

The study was also important because there existed certain external factors which have pre-disposed people in small villages to be receptive to an innovation such as education via satellite. The employment of many Alaskan natives in pipeline camps put them in positions where they have relied heavily on television for their entertainment. Now, the comparatively high earnings of these people have, for the first

time, made it possible for them to purchase television sets.

Furthermore, the introduction and expansion of television into Alaskan villages appeared inevitable; it will no doubt come just as electricity, plumbing, outboard motors, rifles and snowmobiles have come. This study was significant in that it focused on ways of utilizing this technological expansion for educational purposes.

Methodology

In this study the historical method was used; that is, there was a "systematic and objective location, evaluation, and synthesis of evidence in order to establish facts and to draw conclusions concerning events of the past." (21:188). Three tasks, then, were to locate the data, establish facts, and to draw conclusions.

To locate the data, an intensive library search was made using a variety of materials - references, government documents, books, reports, pamphlets, magazine articles, newspaper clippings, microfilm, microfiche, and movies. This source was somewhat limited due to the recent nature of the experiments. Therefore the author wrote directly to the agencies involved to help secure data and reports not as yet published.

The researcher conducted interviews with some of the people who had been involved in various phases of initiating and carrying out the experimental broadcasts via satellite in Alaska. The contacts were informal, in-depth interviews, seeking to gain information and opinions about the particular area in which the interviewee was involved. Stephen Cole, in his book entitled The Sociological Method, described in-depth interviews as being

different from the type of interviews used in surveys. In the latter the interviewee uses a prepared questionnaire, asks all the respondents the same questions . . . In the in-depth interview, the interviewee will follow up on answers and actually engages the respondent in conversation. These interviews are not coded; but quotations from them are used to illustrate a particular point the researcher wants to make. (22:40).

Since the experiments were relatively recent, correspondence files were still available, and these were searched for additional data. Some of the correspondence from various sources had been collected by the Center for Northern Educational Research at the University of Alaska. The author also used information from the offices of the Alaska Education Association, the Tanana Chiefs, and the ATS-1 Satellite Project.

In analyzing the materials the researcher "sought out the facts and conceptions that were pertinent to his (her) topic," as Francis Rummel in his book, An Introduction to Research Procedures in Education, suggested that historical researchers do. (36). The guidelines for determining pertinency were whether the material could be used to help establish facts or answer the questions posed earlier regarding the factors which led to Alaska's inclusion in educational satellite telecommunications experiments, the types and effectiveness of the programs, funding and technological problems, the chronology of main events, and future implications. Consideration was also given to external criticism or the authenticity of the data, and internal criticism or the bias or purposes of the authors.

In presenting the findings, maps, tables, time-line, diagrams and pictures were included to illustrate the written text. Some of these were constructed by the researcher, and some were reproduced from other sources.

Design of the Study

Chapter One laid the foundation of the study. It provided the background and significance of the topic, posed the questions and hypotheses that were researched, and described the methodology that was used.

Chapter Two contained the Review of the Literature. Here the most important relative studies were summarized and discussed as they related to the background (the materials discussed in Chapter One), the history (materials discussed in Chapter Four) and the results (materials discussed in Chapter Five). Since, in a historical study the entire work is based on the literature, this Chapter contained only selected studies, and gave only an overview of the history and results they contained, saving comprehensiveness for the Bibliography and remaining sections of the paper.

Chapter Three was a continuation of the review of the literature, organized to show the sources of the data, together with the type of material available from each source. Besides published materials and reports, the following sources were also utilized: contracts, interviews, correspondence, movies, cassettes and video tapes.

Chapter Four contained the analysis of the data and the findings therefrom. Each of the questions which were posed in the "Statement of the Problem" section of this paper was studied.

In the final Chapter, the entire study was summarized. Then the conclusions relative to the hypotheses were discussed, after which the researcher made her own recommendations.

Chapter Summary

This Chapter provided the foundation of the study, describing its purpose, background, problem, significance, methodology, design, definitions and limitations. The historical method was described as appropriate for this research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Reviewed in this Chapter were the major studies done in the field, including one study giving background information written prior to the experiments, two studies dealing principally with the ATS-1 experiment, two about the ATS-6 experiment, and one pertaining to recommendations or future uses. Specifically, these studies were Alaska, Implications of Satellite Communications for Education, (102), commonly referred to as the UNESCO study since it was accomplished under the auspices of the United Nations Educational Scientific and Cultural Organization, Report on Alaska Use of the ATS-1 Satellite, (100), termed the ATS-1 study, Using Satellite Technology to Increase Professional Communications Among Teachers, (177), a report of experiments conducted by the National Education Association and therefore called the NEA report, Satellite Developments and the ATS-6, (42), referred to as the ATS-6 report, Implications of the Alaska Educational Satellite Communications Demonstration for Telecommunications and Educational Policymakers, (161), known as the PCI report because it was produced by Practical Concepts Incorporated, and the ATS-6 and State Telecommunications Policy for Rural Alaska: an Analysis of Recommendations, (155), known as the CNER report since it was produced under the auspices of the Center for Northern Educational Research at the University of Alaska.

The studies are briefly summarized, and their relevance for this study considered. Discussed are their implications concerning the background (purposes, methodology and significance), history and results.

Summaries of Selected Literature

The UNESCO report was produced by Henry Cassirer of the United Nations Educational Scientific and Cultural Organization and Harold Wigren of the National Education Association, who were asked to make a study of the "feasibility of using satellite communications for television and radio transmission and/or reception of instructional and educational materials in remote isolated rural villages of Alaska." (102:2). The study was made and published in 1970 prior to the beginning of the satellite educational experiments. Their findings and recommendations were four-fold:

1. That use of satellite communication for education in Alaska was not only feasible but necessary.
2. That television should not be undertaken until a more powerful satellite was available.
3. That a satellite demonstration via ATS-1 should be undertaken using its radio capacity.
4. That a video-tape and audio-tape production exchange service be undertaken in lieu of using the ATS-1 for a television experiment. (102:2,3).

The ATS-1 study was written by Charles Buck and Charles Northrip of the Governor's Office of Telecommunications to be submitted to Richard

Marsten of the National Aeronautics and Space Administration after the end of the first school year of broadcasting. Described were three aspects of the ATS-1 experiment, namely technical, medical and educational. (100:3). The technical experiments were carried out by the Geophysical Institute of the University of Alaska and evaluated by them (100:13); the medical experiments were coordinated by the Lister Hill National Center for Biomedical Communications who "negotiated a contract with Stanford University to conduct an evaluation" of this portion of the experiment; (100:13); the educational experiment was "conducted under the direction of a consortium of educators and administrators who chose to contract for their own evaluation." (100:13). The evaluator for the educational experiment was Walter Parker who published his findings in a study called Village Satellite I: Evaluation of Some Educational Uses of the ATS-1 in Alaska. (152). A summary of these findings were contained in the ATS-1 study.

The above report dealt with the use of ATS-1 in its first year. The NEA report dealt with programs via ATS-1 during 1973-74 and 1974-75 sponsored by the National Education Association and reported on by John Sullivan, NEA Director, and others. The NEA, through its affiliate the NEA/Alaska, was one of the agencies which participated in the consortium mentioned above. The consortium not only directed the educational portion of the ATS-1 experiment, but its members provided the programming. The NEA's contribution consisted, first of all, of a satellite seminar for teachers which was a "three-hour credit course designed primarily for teachers in small villages who do not have access to community colleges or other professional development opportunities." (177:4).

The following year a bi-weekly "teacher center of the air" was instituted giving teachers an opportunity to share ideas and discuss pertinent educational issues. This began as a program primarily among Alaskan teachers, but later the outreach was expanded to include other Pacific Communities such as Hawaii, the Fiji Islands and New Zealand. Teachers and staff members from IIEA's headquarters in Washington D.C. were also gathered in Bethesda, Maryland, to participate.

The ATS-6 report was written by J. Russell Burke, consultant, and Frank Norwood, executive secretary of the Joint Council on Educational Telecommunications, Washington, D.C. They stated that the ATS-6 satellite was the "most complex, versatile, and powerful communications spacecraft yet developed." (42:13). The study traced the development of satellites up to the ATS-6, then described the ATS-6 capabilities. How these capabilities were used in a Satellite Technology Demonstration in the Rocky Mountain, Appalachia and Alaska areas was considered. Not too many details were provided about the Health Education Telecommunications Experiments in Alaska, but the report did state that the educational experiments in Alaska "were built upon earlier ATS-1 experience," and that "to help insure that school programs meet the sometimes unique needs of the children in these isolated communities, advisory committees of parents, native leaders, teachers, and administrators have been organized." (42:15).

The PCI report was produced under contract for the National Institute of Education to present "an assessment of the educational satellite communications demonstration (ESCD) in Alaska during the period from July 1, 1974 through September 1975." (161:Preface). Some

of the research for the report was conducted by personnel from the Center for Northern Educational Research at the University of Alaska under a subcontract to PCI. To establish a foundation for their study a brief description of the ATS-6 experiment in Alaska was presented (including the major program efforts, technological features and descriptions of receiving sites), as well as a description of the State of Alaska (including its geography, people, culture and education). A major contribution of the PCI report was the collection and organization of issue papers from correspondence and the press relative to events and evaluation during the project. On the basis of user reactions to the Alaskan demonstration thirteen "recommendations for the future" were derived. (161:I-17).

The CNER report was a study of these recommendations written about one year later by Theda Sue Pittman and James Orvik, directed specifically at Alaskan audiences. They stated,

The recommendations formulated by PCI, while substantial and while they may safely be assumed to have advanced thinking in the field of satellite delivery of educational programs as a whole, were addressed to a more broadly constituted audience than Alaskan groups . . . The authors of this report have taken on the assignment of analyzing the recommendations of the PCI report, especially as they relate to Alaska's multi-cultural population. (155:iii).

Purposes

The afore-mentioned studies, while made by a variety of individuals before, during and after the experiments, had a two-fold purpose in common with this researcher, namely to provide information as to the events that transpired and to consider the implications of these events. Each of the above reports, however, related to a specific time period or dealt with either one or the other of the two experiments. This investigation

attempted to synthesize the reports, together with data received from other sources into a study which encompassed both experiments.

The methodology used varied from report to report. Three of the studies included interviews as a source of data. The UNESCO study based their findings almost entirely upon approximately forty interviews conducted at Anchorage, Bethel, Nome, Juneau, Fairbanks, and Kodiak. This researcher also found interviews to be an important source of information.

With the exception of the UNESCO report which was made prior to the experiments, and the CNER study made shortly afterwards, the other studies mentioned here were made during or immediately following the experiments and therefore the authors could report from their own observations what was happening. Since the reports were made so close to the project there was not a great deal of other literature to peruse. This writer, however, had the advantage of finding magazine articles and other related studies and therefore developed a more extensive bibliography.

None of the reports made use of audio-visual materials as a source of data. This researcher found that movies, and tapes were unexcelled sources of information about how Alaskans lived, about the Alaskan educational system, and about satellite technology.

A unique method of gathering data was used by the PCI reporters in what they termed "retrieving user reaction." They explained,

The basis for the projections toward the future presented in this section are comments by village level users of satellite television as offered them . . . The comments should be thought of as an in-depth discussion by educated consumers about an impending product, where the product is educational television. (161:III-1).

Comments were received as a result of interviews with native residents, and taped comments made at evaluation conferences held directly after the close of the experiment.

The reports confirmed that a study of this subject was of significance to the state, the nation, and other countries. The ATS-1 report stated,

Any experience that the state can gain through the use of experimental communication satellites will provide additional information, experience and expertise which can be put to good use in the design of future operational satellite communication systems for the state. (100:2).

The UNESCO report contained this statement, "all national and international agencies . . . will wish to be kept informed on its progress and be in a position to learn from it." (102:44). The PCI reporters said, "The subject matter of this report is of national and even international importance." (161:Preface).

History

A survey of the literature provided information as to the history of satellite educational programs in Alaska. A detailed analysis of this was provided in a later chapter, but an overview of the history was included here to prepare the reader for what will come.

The suggestions made in the UNESCO report, that the ATS-1 be used for radio broadcasting and that television programming wait for the more sophisticated ATS-G satellite, was followed.

The ATS-1 report stated that

In August of 1971, regular radio networking was instituted . . . In September of that same year, experiments providing biomedical communication to Alaska's remote areas and a similar system

utilizing the biomedical equipment to provide educational assistance were instituted. (100:3).

The educational experiment via ATS-1, then, was a part of a medical experiment. The experiment "was conducted under the direction of a consortium of educators and administrators." (100:13). It was various members of the consortium and even audiences who provided programming.

Since no provision had been made for program production, the educational project director drew upon other organizations as well as the rural listeners for help in programming. (100:16).

The experiment continued until it was phased into the ATS-6 experiment. Each year an evaluation was accomplished by an independent evaluator, Walter Parker. "With an independent evaluation of the programs, the educational program development was given an objective over-view of successes and failures." (100:30).

The ATS-6 experiment lasted from October of 1974 through May of 1975, with preparatory work dating back to the early 1970s. The PCI report stated that

In October of 1974 transmission via satellite of educational television programs to sites in rural Alaska was begun, and in mid-May 1975, NASA's ATS-6 satellite was moved to India, ending transmission of programs to rural Alaska. The project was part of the Educational Satellite Communications Demonstration (ESCD) which took place under the auspices of the National Institute of Education (NIE). (161:I-1).

The CNER report explained that it was "The Alaska Governor's Office of Telecommunications (GOT)" which "received funding for programming, installation and maintenance." (155:5). The GOT, then, was charged not only with the management, but also with program production in the ATS-6 experiment.

Evaluation was accomplished internally by the GOT staff, but "NIE decided that the self-evaluation to be undertaken by the program

operators should be supplemented by an overall evaluation undertaken from the perspective of NIE, federal and state policymakers." (161:I-1). "Therefore in June 1974 the NIE signed a contract with Practical Concepts Incorporated (PCI) to evaluate the Alaskan demonstration." (161:I-2).

Results

Technologically, although there were problems and adjustments in the equipment at the outset, the general consensus was, as the ATS-1 report stated, that "the satellite radio provides an acceptable level of communications for all villages." (100:32). Also, satellite television reception was adequate - problems in this area were not mentioned by the PCI reporters. Technological shortcomings were that reception was limited to the sites which were chosen for participation, as the CNER report stated, "The ATS-6 footprint and lack of funds caused severe restrictions on the number of sites available to the education project and their location." (155:5). In the chosen sites only one television receiver was available for all viewers. This led to the following statement by the CPI reporters, "The demand for home television in rural Alaska is high. However, the verdict is still out on whether there is high demand for television in a centralized place within the village." (161:III-15).

The evaluator of the ATS-1 project stated that "the educational project was generally successful in developing a wide range of programs." (100:30). Concerning the NEA programs the following statement was made:

In the opinion of the NEA and the NEA-Alaska staffs and from the evaluation reports received from the field, three of the NEA experiments - NEATS, NEASAT, and the Pan-Pacific pilot programs - were highly successful. (117:19).

Exactly what "successful" meant was not delineated. However,

the general goals of both experiments were expressed in terms of gaining hands-on experience in using the technology, and not in terms of educational achievements.

The ATS-6 report said that there was an eagerness to continue and expand the experiments if or when satellite time became available again, and that this was an important indication of the success of the experiments.

The eagerness to continue may be a better indication of the importance of the ATS-6 to the educational community than the various findings which may be drawn from the experiments themselves Thus, when the results are in, it will not be surprising if the full potential of satellite communications in the improvement of rural and minority education . . . is not immediately visible. (An observer at Kitty Hawk could have been forgiven for muttering that there already existed more efficient means for travelling a few hundred yards than the Wright brothers' clumsy invention.) (42:16).

Chapter Summary

In this Chapter selected studies about education via satellite in Alaska from 1970 to 1975 were identified, summarized, and their relevance to this dissertation indicated. The literature showed that there was a need to produce yet another study as suggested by this researcher.

Although action research was utilized by the authors of most of these reports, this researcher utilized interviews as a major source of data in common with the UNESCO, NEA, and PCI reports. The literature reviewed in Chapter II did not use an extensive bibliography, nor audio-visual resources. Such resources became unique contributions of this investigator's report.

The literature of the field revealed that a study of this subject had significant implications for the state, the nation, and

other countries.

The history of the experiments and their results were given an overview, indicating that the literature established the fact that two experiments had been conducted; that reception and program production were generally favorable, but that the scope of the broadcasts was limited to the sites chosen for participation. Details of the historical development and the evaluations based upon the review of these studies together with other literature in the field, 45 additional interviews and audio-visual materials, are presented in Chapters III and IV. —

CHAPTER THREE

SOURCES OF DATA

Introduction

According to Walter Borg and Meredith Call a most important aspect of an historical study was "the systematic and objective location" of facts. (21:188). Francis Rummel said that an historian should "seek out facts and conceptions." (36:173). To fulfill this objective the researcher has consulted a wide range of sources including government records and reports, books, journals, correspondence, audio-visual materials, and individuals. In this Chapter these sources were further identified and the types of information received therefrom were discussed.

Government Documents and Publications

Telecommunication via satellite for education in Alaska has been regulated and influenced by international, national and state documents and publications. International documents were those from the International Telecommunications Satellite Consortium (INTELSAT) and the United Nations; national documents came mostly through the U.S. Government's dealings with the National Aeronautics and Space Administration (NASA) and the Department of Health, Education and Welfare (HEW); state documents were those of the Alaska Legislature, the Governor's Office of Telecommunications (GOT), and the Alaska State Department of Education (DOE). Other sources of information were the hearings that were held in

connection with legislative action. Persons working with the satellite programs in Alaska have testified before both Congressional and State committees; questions have been asked and answered.

Since satellite communications could reach all corners of the globe, international agreements were necessary for their operation and control. An "International Telecommunications Satellite Consortium, known as INTELSAT, was established under a pair of International Agreements signed in 1964." (12:3). By 1975 ninety-one nations were members of the consortium. (48:1). The American representative was the Communication Satellite Corporation, known as COMSAT, which was incorporated under the Communications Satellite Act of 1962. (12). This act also indicated that NASA should provide launching facilities on a cost reimbursable basis for member countries. (133:2).

There were two committees under the United Nations that dealt with satellites: the International Telecommunications Union (ITU) having jurisdiction over hardware, and United Nations Educational, Scientific and Cultural Organization (UNESCO) dealing mostly with software. "The ITU has concerned itself with technical questions such as allocating frequencies and parking spaces," (30:43), while UNESCO has concentrated on "educational and cultural issues". (37:v). Two resolutions of the UN influencing satellite communication in Alaska were Resolution 1721 D XVI, "International Co-operation in the Peaceful Uses of Outer Space", (10), and Resolution 2916 (XXVII), "Principles Governing the Use by States of Artificial Earth Satellites". (9).

It was UNESCO, in cooperation with the National Education Association, which made one of the earliest studies addressing Alaska's

educational communications needs. This study, entitled Alaska: Implications of Satellite Communications for Education (102) was reviewed in Chapter Two. Other UNESCO satellite-related publications were Space Communications and the Mass Media (169) and Communications Satellites for Education, Science and Culture. (168). These reports were part of a "programme of studies and research on the uses of space communication for the free flow of information, the spread of education, and greater cultural exchange" that should be "fully applied for the benefit of all countries." (168:3).

Generally speaking, at the national level it was NASA that provided the hardware and HEW the software. The NASA Authorization Act (19) was the act by which Congress provided the funding and specified what projects were to be developed, continued, or disbanded each year. Thus decisions regarding the continued use of ATS-1 for broadcasting in Alaska, the launching of ATS-6, its use in Alaska for 1974-75, and its later deployment for use in India, were reviewed under this act.

NASA also published documents or pamphlets. One such was named simply NASA and described the various programs with which they were involved including the Applied Technology Satellites. (146:3-4). Another, NASA Facts, an Educational Publication, dealt with the ATS-6 programs and pointed out, among other things, that "the same telecast can be made to four separate audiences, each with a different language, who would hear it simultaneously in their own tongues; for example, English, Eskimo, an American Indian dialect, and Spanish." (73:4).

Contract No. HEW-OS-72-149 from HEW to the Educational Broadcasting Commission of the Department of Education, State of Alaska, (AEBC), provi-

ded for the development of a "planning document that will provide a definition and description of demonstrations which will employ the specific characteristics of the ATS-F satellite in solving educational and informational problems of rural Alaska." (15:Article One). It was under Title III, Sec. 306 of the Elementary and Secondary Education Act (ESEA) that money had been made available for the Action Study of the early ATS-1 broadcasts. (18). With the establishment of the National Institute for Education (NIE) as the agency within HEW to specifically handle educational matters, contracts had been let by them. Contract No. NIE-C-74-0148 required Practical Concepts Incorporated to make an evaluation study of the Alaskan ATS-6 demonstration. (16). Some of this work was sub-contracted to the Center for Northern Educational Research of the University of Alaska. NIE's Contract 400-76-4005 (17) with the Alaska Office of Telecommunications resulted in the publication of a booklet with accompanying video tapes, the purpose of which was "to serve as a primer for the Alaskan educator unfamiliar with the technology of telecommunications" and to "serve as a stimulus for generating ideas for the productive application of telecommunications to educational needs." (17:Preface).

The NIE also published documents and reports and had become the storehouse for educational materials in that it operated "the largest federal library for educators" (90:7) with 130,000 volumes plus 150,000 research reports and periodicals. In one of their quarterly newsletters called Information was an article entitled "Satellite Helps Kids in Isolated Regions," which mentioned NIE's involvement by saying, "NIE is one of four federal agencies sponsoring projects that will operate via

NASA's ATS-6 this year. NIE's project attempts to discover what impact a complex education technology can have on students, parents and teachers in three remote areas of the country: Appalachia, the Rocky Mountain States, and Alaska." (90:1). A four page brochure, "Education's Own Satellite," was written by Mary Dyer, NIE staff assistant. She stated, "Specifically, NIE wants to find out the actual costs involved, what the people in such areas think of information being received and sent via satellite, and what subjects and ways of presenting the information are most effective in this medium." (46:1).

In the 94th Congressional Hearings it was stated that "the communications program within NASA has gone from an annual funding level of the order of fifty million in the fiscal year 1973 down to about 7.5 million this year, and probably will bottom out at a five million level, or about one tenth of the effort we had in previous years." (13:565). When asked for an explanation of this, the NASA representative replied,

With the "coming of age" of communication satellites' commercial capabilities in the United States and abroad the need for continued NASA sponsorship of experimental communications satellite development and demonstration has diminished. Consequently a phase-down of this activity was begun in 1973. . . . We have in one sense accomplished what we set out to do. The technology development now has a commercial capability which is being carried out. (13:564-65).

The ATS program in Alaska has been directly affected by this phase-down.

At the Alaska State level there was legislation relative to the operation of satellite communications in the state, such as House Resolution #78 of the Seventh Legislature asking for the "FCC (Federal Communications Commission) to permit adequate satellite separation for small earth station use in thin market service areas." (10). House Bill 297 was an "Act Creating the Public Communications Commission" and

its Sec. 44.19.511 spoke of the duties of the Commission with respect to educational broadcasting. (6). The State of Alaska issued contracts for program production such as those with Northwest Regional Education Laboratory (NWREL) and broadcast station KUAC.

The State of Alaska has issued publications and reports. One such, by the Office of Telecommunications, was named Report on Alaska Use of the ATS-1 Satellite through September 30, 1972. (125). It pertained to the beginnings of satellite broadcasting in Alaska, and even at this early time such broadcasting was considered "inevitable" and that "any experience the state can gain through the use of experimental communication satellites will provide additional information, experience and expertise which can be put to good use in the design of future operational satellite communication systems for the state". (125:2). A later brochure described the ATS-6 project, mentioning that the age group of these educational programs was not conducive to interaction. (Interaction was a special question and answer period following the broadcasts.) (117:4). Telecommunications and the Future of Alaskan Education was a twelve-page newspaper style presentation sent out by the Office of Planning and Research of the Alaska Department of Education to give background information to accompany a questionnaire with the purpose of ensuring that "the proposal now being developed for telecommunications systems will directly meet" the needs of the respondent. (157:12). State census reports and Annual Reports of the State Department of Education were invaluable sources for statistics about Alaska and its educational needs. In the Annual Report, Department of Education, 1971, satellite communication was mentioned as one vehicle for making smaller

high schools feasible in the outlying areas. (140:36).

Books

There were no books that dealt specifically with Alaska's involvement in education via satellite, but there were books about satellite communications in general, and books which described educational problems in Alaska. These supplied needed background information and helped to promote a comprehension of the situation.

Berniece Kohn's Communications Satellites, Message Centers in Space, traced the history of satellites from the science fiction stage, through their actual launching and their development until 1974, then ended with a chapter entitled, "Communications of the Future." (29:45). Communications Satellites, How They Work, by Alvin Lukashook, gave "intriguing explanations of the scientific principles that have made communication by satellite possible. And against this carefully constructed background such intricate operations as signal transmission, amplification, reception, power generation, and satellite tracking, emerge with clarity and meaning." (31:the bookcover). Man-Made Moons, Satellite Communications for Schools, (20), gave information about the particular equipment used in educational satellite broadcasting in a chapter entitled "Satellite Systems - Uplinks, Transponders, and Downlinks." (26:15).

A few recently published books dealt with the international ramifications of satellite communications. Regulation of Direct Broadcasting from Satellites was mainly about the involvement of the United Nations explaining that,

the whole range of issues that characterize domestic debates on communications policy - freedom of speech, censorship, fairness, access, to name only a few - has acquired global dimensions. The United Nations Committee on the Peaceful Uses of Outer Space has become the focal point for these wide-ranging policy discussions. (37:v).

The Politics and Technology of Satellite Communications mentioned the mingling of national and international policies. "American space communications is a matrix of policies," both national and international, yet "there is a wide frontier where the consequences of resolving certain issues affects both environments." (25:180). Another interesting statement was this,

The popular proposition that we live in an era when technological revolutions have left political man far behind is not true for communication satellites . . . The political and technological developments associated with INTELSAT . . . have paralleled each other in an orderly and harmonious manner." (25:148).

Outer Space and Inner Sanctums dealt with the political controversies of large corporations such as AT&T and COMSAT. There was a Foreword by Ralph Nader in which he stated, "The First Amendment guarantees the right of free speech but it does not guarantee the right to "megaphones" - even those built with the taxpayers' revenues and operating through publicly owned resources like communication satellites." (28:v). This was the "tone" of much of the book itself. The Impact of Space Science on Mankind was not as politically oriented; rather it dealt with programming in various countries. It mentioned that "adult education will benefit most from educational television" (20:62); that the United Kingdom has had a University of the Air using correspondence and educational TV (27:63); and that "The United States, however, is in the deplorable situation of having discontinued their educational programme due to lack of support." (27:63).

One of the best known books about the educational problems of rural Alaska was A Program of Education for Alaska Natives by Charles K. Ray. Written in 1959, this did not contain references to satellite communications, but it was a well-documented study of conditions as they were at that time with recommendations for setting up a more effective educational system. Dr. Ray claimed that "education can serve as one vital influencing force designed to decrease the difference in attainment and opportunity which exist at the present time between native and non-native groups." (36:269). Another book, Prehigher Education in the Unorganized Borough: Analysis and Recommendations, pertained to proposed reorganization of the Alaska State Operated School System. (24). Education in the North, edited by Dr. Frank Darnell, was a collection of papers presented at an Arctic Institute in 1972, containing discussion of current educational situations in Norway, Greenland, Sweden, Canada, Russia as well as Alaska. (23). In the Preface of Cultural Influences in Alaska Native Education by James Orvik and Ray Barnhardt there was this statement, "No one collection of readings can adequately describe the panorama of educational programs and perspectives that exist in Alaska today. The pace of change is too quick and the obsolescence of ideas too advanced for so vast an undertaking." (34:Preface). Education via satellite was one program in this vast panorama.

Magazine and Newspaper Articles

Every aspect of the new space age, including television via satellite, have become current subjects for magazine and newspaper stories. Therefore this type of literature proved to be good sources of data re telecommunications and its use for education in Alaska.

One magazine article that described an ATS-1 experiment is "Alaskan Seminar by Satellite" published in Today's Education, May 1973, which mentioned that the purpose of this particular experiment was "to explore the feasibility of using satellite communication for the professional development of teachers in isolated rural areas of our nation." (40). Described was a seminar participated in by personnel in Alaskan villages, Juneau and Fairbanks, Alaska, and Bethesda, Maryland. "Thus the questions and answers may originate 6,000 land miles--and nearly 50,000 space miles apart." (72:40). The linking of the earth stations to cable television was mentioned as a future possibility for getting programming into private homes. (72:41).

The Northern Life Editor of the Fairbanks Daily News-Miner has written a series of articles re satellite communications, in which in March 1976 she posed the question, "What use should be made of the new capabilities?" (68:9). Some new ways suggested were: use by the Tanana Chief's Conference Land Claims College to discuss or answer problems students may have about their correspondence classes, tying into a group such as the Agency for Instructional Television which could supply canned programs, expanding development of locally produced programs, and making a transmission during off hours to be video-taped for showing at a more convenient time. (68:9).

Journal articles have also been important sources for "gems" - a sentence or two, especially well-phrased, that gave an exceptional insight into specific aspects of education via satellite for Alaska. In an article entitled "Satellites, a Status Report," published in Public Telecommunications Review in 1974, Philip Rubin told about the science

fiction writer who, in 1945, had described an artificial satellite in stationary orbit. Mr. Rubin then said, "Twenty years later Clarke's prediction came true." (66:29). In talking about the ATS-1, Albert Feiner in an article called "Health Care and Education: On the Threshold of Space" published in Science in 1974, said, "A lecture has been transmitted from the medical school at the University of Washington at Seattle to medical students in basic genetics at the University of Alaska; approximately twenty-two nurses in small clinics throughout Alaska regularly 'attended' a three month's course on coronary care." (49:7). In "No Longer Pie in the Sky" in April's issue of TV Guide, it was pointed out that these experiments were not "direct to home television . . . stationless, networkless television is not just over the horizon." (87:4). An interesting comment about the ATS-6 use in India was the following: "In many villages the electrical power necessary for the television sets will come from bicycle generators pedaled in relays by enthusiastic village boys." (54:6). The above was found in an article by Richard Hoagland called "The Talking Star of Arthur Clarke" published in The American Way (the American Airways inflight magazine) in January of 1975. In discussing costs of an educational system via satellite, Howard Hupe in an article published in Educational Technology in October of 1974, "An Education Satellite: Costs and Effects on the Educational System," said,

Without the benefit of the rough cost data assembled here it might appear intuitively obvious that such a sophisticated and apparently expensive delivery technology as a satellite would require massive audiences . . . As we have seen, however, people in smaller and more isolated communities could be reached and the cost of delivery could be brought down to pennies per hour, so that the very poor could afford better educational opportunities. (55:52).

Regarding international implication of satellites, Burton Edelson in an article in Science of October, 1975, entitled "Satellite Communications - A Benefit Realized" stated,

Whereas Apollo-Soyuz showed that two nations can cooperate in space for an important mission at great expense, Intelsat has shown that many nations can do so for over a decade and make money doing it. The 91 member countries own the satellites and provide for their development, launching, and maintenance. (48:1).

In some instances journal articles have a tendency towards the sensational or dramatic, thus there were titles such as "Education's Rising Star," (44), "Teacher in the Sky," (51), "No Longer Pie in the Sky," (87), "A New Star Rises in an Overcrowded Sky," (86), and "Lighting Up the Earth's Dark Corners with TV from the Sky." (69). One article began, "Each Monday in thirteen frigid and far-flung villages, teachers are taking part in a professional educational seminar bounced off a satellite 22,300 miles above the equator . . . Some participants wrap themselves in blankets . . ." (72:40). In another article was this statement, "Whether treating a neck problem in Omak, Washington, or a belly-ache in Kodiak, Alaska, advanced medical students can get diagnostic guidance via satellite from their professors in Seattle." (67:18). This sentence said it picturesquely: "You can't see him, of course, but that 2,600 pound, 26 foot tall teacher is up there, beaming lessons every day to millions of people in the sparsely populated regions of the U.S." (51:539).

The magazines that most frequently had articles about this subject were Educational Technology, American Education, A-V Instructor, Phi Delta Kappan, Today's Education, and The Alaska Teacher. The news-

paper articles came mostly from The Fairbanks Daily News-Miner, The Anchorage Times, The Anchorage Daily News, and The Juneau Empire.

Related Studies

When the researcher first began the data collection for this dissertation there were seemingly few related studies available. Writing to the agencies involved produced little significant material except from the National Education Association Office in Washington. However, as time progressed an increasing number of studies were made and began to find their way into the ERIC and ALASKANA systems. Also from persons interviewed some unpublished reports were received. Several reports were reviewed in Chapter Two, but the following was included to show that related studies were an important source of data.

One doctoral and one master's thesis have dealt with this field, but these encompassed an earlier time frame. The doctoral thesis, by Ronald Brewer in 1969, was called A Feasibility Study of Communication Satellites for Education in the United States. (97). This traced satellite communication history through 1969 and concluded with this statement, "Obstacles to the development of communications satellites for education will emanate from social, economical, and legal limitations rather than technological inadequacies." (40:93). The master's work was done in 1970 by Nick Goad at the University of Alaska and was called An Evaluation of Current Planning for Alaska Satellite Communications. (115). The thesis mainly pertained to commercial communication and the agreements with Radio Corporation of America to provide this, but it did touch briefly upon satellites' educational potential. It contained this statement:

There is a strong belief that ITV and ETV could expose more natives and that TV exposure of information, ideas, and the English language would help in the development of the village communities. . . . As a media it (TV) has unlimited range and capacity for influencing or promoting the adaptation of social mores. (115:42).

A study of the ATS-1 program by Walter Parker was called "Village Satellite: An Evaluation of Some Educational Uses of ATS-1 in Alaska." (152). The evaluation was accomplished by listening to broadcast tapes, and interviews with persons involved in the production as well as with listeners. When they were appointed in the villages the utilization aides became the liaisons for reports. The work described the various villages in the project, the programs produced and their objectives. Finally, the statement was made:

High costs and insufficient capacity are inhibitors to communications that are well known in Alaska. Satellite communications offers a solution to both problems. We are lucky to have satellite capacity available now to test with, and we should use that capacity to determine our needs in educational broadcasting. (152:100).

Steven Porter in a paper presented at the Telecommunications Policy Research Conference in 1976 entitled, "The National Institute of Education's Educational Satellite Communications Demonstration: Lessons Learned and Their Federal Policy Implications" talked about the NIE's "seventeen million dollar" experiment (159:4) and said, "No case has to be made for the need for satellite telecommunications to deliver social services to remote communities in the Alaska bush." (159:3). However, in the continental United States where communication systems existed, the question to be answered was "Would satellite systems be cheaper?" (159:3).

Interviews and Correspondence

Interviews have been an invaluable source of information in this research, not only for the establishment of facts and clarification of conflicting reports, but also for anecdotal and incidental information. It was found that participants in the NEA experiments could be talking to each other on different days since broadcasts crossed the international date line (195) . . . that Alaska communication history goes back to the days of Abraham Lincoln when it was decided to build a telegraph line to Europe via Alaska (239) . . . that Comsat policy of naming earthstations after places, not people, was circumvented by naming a small lake near Talkeetna "Bartlett Lake" so that Alaska could have a "Bartlett Earth Station" (211) . . . that residents of one village would listen to satellite programs except when they were scheduled on Bingo nights (237) . . . that by 1980 television receivers could be worn like wrist watches (242) . . . that broadcasts have been interrupted to take care of medical emergencies (211) . . . that in the future satellites could be used to transfer energy, not just information (238) . . . that the satellite communications experiments caused some villages to improve their electrical system. (228).

As part of the satellite experiments in Alaska, questionnaires and interviews were conducted with the listeners to try to determine the effectiveness of the programs. This researcher did not endeavor to duplicate this, but rather attempted to interview at least one person who had been involved with each aspect of the experiments. The following persons furnished information about the technical aspects of satellite broadcasting: Robert Merritt, who had helped to design and test the

ATS-1 receivers, Ronald Rasmussen who had helped to install the receivers in the rural villages, George Shaginaw who had supervised the installation of the ATS-6 earth stations, and James Hayes who helped to operate Bartlett Earth Station. The following persons had helped to produce some of the programs: Robert Cooksey, Marianne Eininger, Don Ian Gray, Margaret Liebowitch, Karen McPherson, Roger McPherson, Donald Upham and Karen Parr. The researcher discussed materials written with some of the following authors: Augie Hiebert, Robert Merritt, Glenn Stanley, Judith Kleinfeld, James Orvik, Walter Parker, Theda Sue Pittman, Ernie Polley, Rex Taylor and Jennifer Wilke. These people were not a part of the two experiments, but represented agencies which would like to have a part in future programming: Reginal Emmert and Edward Cridge of Media Services at the University of Alaska, James Smith and Jane Windsor of the University of Alaska Extension Service. Educators and politicians who had an interest in the experiments included Fred Brown, Darwin Heine, Niilo Koponen, David Lannigan, Peter Larsen, Rex Taylor, Robert Van Houte, Millie Wedel, Kathryn Hecht and James Orvik. For a list of the 45 persons interviewed, together with their affiliation, the main subject of the interview, the date and place, see Appendix II.

The researcher used correspondence files of the Center for Northern Educational Research which had gathered materials as part of a contract to participate with Practical Concepts Incorporated in writing an evaluation of the ATS-6 project. Also available have been files at the NEA/Alaska office in Fairbanks, the Tanana Chiefs' Office (which inherited the files from the ATS-1 Action Study at the University of Alaska), and the ATS-1 office at the Geophysical Institute, University

of Alaska. Besides helping to establish events, searching correspondence revealed information that helped to interpret and give reason for the facts.

In a memo to the Secretary of HEW from the assistant Secretary he recommended less studies of Alaska's communication needs and a faster move into actual broadcasting and said, "One suspects that a small dose of cure might be preferable to more diagnosis." (193). Mr. Wigren told this story in a letter to Dr. Barnhardt after one of the NEA broadcasts:

We have a few more gray hairs this morning after the "hair-breath-Harry adventure" last night! It seems that NIH had moved all the transmitter equipment out of the regular control room to an adjoining room. Because of illness their engineer had been away from the office for three days during the move, and the right connections were not made in the equipment. We finally got the engineer out of bed at 2 a.m., and he tried to explain on the phone what could be the problem. We then got it to work. (241).

On the bottom of one letter these words were written with a red pen, "Need slides ASAP. Harold already in panic because they aren't in his hands." (196). In a memo from Hilary Hilscher, GOT, was this statement, "The most important results of the demonstration (ATS-1 and ATS-6) is proving to commercial common carriers the technical feasibility of the low-cost ground station system." (212).

Audio-Visual Materials

Audio-visual sources used included 16 mm. movies, cassette tapes and video tapes. Two types of materials were relevant to this dissertation, namely, those which gave background information about satellites or Alaskan culture, and those which were a part of the demonstrations - the actual programs presented.

For technical information about satellites, one movie, Space Science, Man-Made Satellites, (265), showed "how passive satellites (without instruments), active satellites (with instruments), and manned satellites are placed into orbit, how they function, and the valuable information they transmit from space." (245:241). Earth Satellites, Explorers of Outer Space, (254), portrayed various satellites, including those for communications. One concept, of the many visualized in Space Science for Beginners, (264), was that of communications satellites. Principles of Orbit (259) talked about these principles and "how they govern the flight of an orbiting satellite." (245:235). Another description of launching and orbiting of satellites was visualized in Space Science, an Introduction. (263).

Two video tapes, Education and Telecommunications in Alaska and Education and Satellites in Alaska have been produced by Jennifer Wilke, Rex Taylor, and Ted McIntire of the Alaska Office of Telecommunications, to accompany their booklet, Educational Telecommunications Alternatives for Alaska. (122). The authors were of the opinion that:

Nowhere in the world has an exploration of the full range of telecommunications services for education been done before. Alaska, and the Department of Education, are in the unique position of setting international precedents for a statewide network fully utilizing all aspects of telecommunications. (122:1).

The video tapes described with detailed diagrams how a satellite worked and then continued with a description of its technical capacity. Five basic communications categories or mediums were shown - "audio, hard copy transfer, data transfer, video and video/audio." (122:3). The audio, video and audio/video referred to radio and television broadcasting; hard copy transfer dealt with satellites' capacity to transmit teletype

and telecopy; data transfer involved computer access. In Alaska from 1970-1975 the ATS-1 satellite was used mainly for one-way and two-way audio experiments, while the ATS-6 was used mostly for video; a combination of two-way audio via ATS-1 and one-way video via ATS-6 was used for the Alaska Educational Telecommunications Demonstration. These video-tapes also showed capabilities of satellite communications that were not endeavored at this time, but which had implications for future educational uses, such as Computer-Aided Instruction and Computer-Managed Instruction. The producers made this remark after displaying several "telecommunications alternatives," "A good working premise is that there is practically nothing that can be thought of that can't be done by some medium or combination of mediums." (122:20).

Of the vast variety of films produced dealing with Alaska, one was specifically about the use of satellites in this state, namely Satellite House Call. (261). It depicted several instances in which the Village Health Aide had been assisted in diagnosis and treatment of villagers with the help of the area doctor who was contacted via satellite. In the catalog of the Alaska State Library Films this notation was made in describing this film's contents,

The ATS-1 Satellite . . . has made possible communications with the most remote areas of Alaska. Technical information, daily medical consultation, education, emergency assistance of all types, are but a few of the advantages which may be realized in these areas which heretofore had little contact with the outside world. (245:227).

Airways to Learning (248) described how various high school students have to take to the "airways" in order to complete their education. "High school students in Alaska are sent to boarding schools

outside their village. (This film) shows how students are transported from rural areas by boat, bushplane and airlines." (245:1).

Schools of Alaska (262) was a film that showed scenes from many Alaskan schools taken just prior to the beginning of the satellite experiments. Schools included were those in Juneau, Haines, Tok, Dot Lake, Delta Junction, Fairbanks, Nome, Copper Valley, Anchorage, Sitka, and the on-base schools at Eielson, Fort Richardson and Elmendorf. "Produced in 1968, this film touches all aspects of education in Alaska." (246:3).

Education in Eskimo (257) dealt with the bi-lingual problem and explained "the growing need for reading and understanding of the English language even though it is taught secondary to Eskimo in the schools." (246:2).

The last three films provided some insight into Alaska's educational situation; the following were mentioned as giving more information about Alaskan culture in general. Alaska, America's Northern Frontier (249) stressed how the regions of the state varied. Alaska, End of the Last Frontier (250) made a plea to "preserve the wilderness and to preserve the identity of a people." (246:9). Alaska the 49th State showed the people and their work as well as physical and man-made features. (251).

Locating tapes of the actual programs presented was more difficult for the ATS-1 programs than for the ATS-6. The former were produced by different agencies over a three-year period and were not always kept. The ATS-6 programs were produced as a part of the experiment and were available either from the Governor's Office of

Telecommunications or from the Alaska State Library which had distribution centers both in Juneau and Anchorage. The fact that there has been a demand to rebroadcast some of these programs was a testimony to their effectiveness and popularity, according to David Upham, General Manager of Station KUAC.

Chapter Summary

The sources consulted have yielded many facts, figures and opinions regarding the use of satellite communications for education in Alaska during the 1970 to 1975 time span. The sources identified and utilized were library materials such as government records, related studies, books and journal articles, as well as correspondence files, interviews and audio-visual materials.

CHAPTER FOUR

ANALYSIS OF DATA AND FINDINGS

Introduction

In submitting the materials to external criticism, it was found that in as far as could be readily determined, all materials were genuine. Since the experiments were so recent, any external falsifying of reports would readily have been detected.

Concerning internal criticism, however, it was admitted that most materials had an Alaskan bias. Many of the sources used by the researcher were produced in Alaska; many were written by the agencies which received the funding to carry out the experiments. In the ATS-1 experiment the evaluation was done by an "independent evaluator," but he was an Alaskan and hired by the consortium which produced the programs. His evaluations were reviewed by another evaluator from California, but he was also remunerated by the Alaskan groups. The National Institute of Education contracted with Practical Concepts Incorporated, a Washington, D.C. based group, to make an independent study of the ATS-6 experiment. They, in turn, had the Center for Northern Educational Research of the University of Alaska as a subcontractor, and therefore the Alaskan influence was again felt. This researcher was herself an Alaskan, and that influence was no doubt evident in the study. An attempt has been made to make an honest presentation, but these findings should be prefaced by the statement that there no doubt was an Alaskan

bias in the materials selected.

In selecting the materials and presenting the findings the questions which were posed at the beginning of this study were utilized. Specifically, the information was organized to answer these questions:

1. What factors were significant in causing the inclusion of Alaska in educational experimentation via satellite?
2. What was the chronology of the main events?
3. With what programs was Alaska involved during this period?
4. How have satellite communications been used for educational purposes other than the broadcasting of specific programs?
5. How effective have the broadcasts been (how evaluated)?
6. How were the experiments funded?
7. What technological problems and advances were encountered?
8. What were some implications for future continuation and development?

Why Alaska Was Included

The emergence of three sets of factors can be said to have contributed to the beginnings of education via satellite in Alaska. First, there was Alaska's desperate need for an improved communication system for education; second, satellite technology had developed to the stage wherein it was capable of meeting most of these needs; and third, there were men of vision who recognized the needs, envisioned the opportunities, and worked diligently to promote the application of satellites to the Alaskan situation.

The State of Alaska covered a vast area - 586,412 square miles - and had a relatively small population - 302,173 people. (51:539). Two-

thirds of Alaska's 265 communities could not be reached by rail or road. (14:3620). A very rough, swampy, and mountainous terrain, an extremely variable climate, plus the presence of radio-disturbing aurora borealis, created a situation in which conventional methods of communication were not effective. Professor Glenn Stanley of the Geophysical Institute, University of Alaska, explained the communication problem by saying,

Communications between remote areas in Alaska has traditionally been by HF radio.....Without a long discussion of the variables and their interrelationships as we know them now, suffice it to say that HF communications between two points in Alaska will, at best, be practicable for only a small percentage of the time and may not be available at all for several consecutive days. HF (high frequency) communication networks are completely unreliable and many areas may be without any form of communications for extended periods. (176:3).

Further complicating the Alaska communication situation was the fact that "65,000 of Alaska's 325,000 people are Eskimos, Aleuts, and Indians, who speak a variety of languages and dialects" (14:3620). These people needed broadcasts that they could understand; the school children needed more English-speaking models. (58:40).

Poor communications imposed hardships on Alaska's teachers, especially those in remote areas. It was difficult for them to secure materials on time, to confer with fellow teachers, to attend meetings and planning or training sessions. This may have been, in part, responsible for the high turn-over rate of "bush" teachers.

The High School situation in remote areas was another of Alaska's educational problems. Until recently young people have had to leave the village when they became of High School age in order to continue their education in larger communities where High Schools existed. (248). Since the late fifties residents of small villages have been demanding

their right of High School education at home. This has resulted in the establishment of many small understaffed High Schools which could not begin to offer the programs possible in larger areas. (138).

Alaskans have been plagued by the fact that it often took weeks or even months to receive books or magazines from the "outside". If a student had a question to be answered, or needed certain facts or figures, by the time these were received the need had long since passed or been forgotten.

Two other educational problems were: preschool education, and the expansion of the Community College System into smaller communities. Both of these were hampered by the lack of sufficient appropriate materials and personnel to carry on effective programs.

Satellites provided the potential for meeting these needs. A satellite could be situated in such a way that it could broadcast to one-third of the earth's surface simultaneously. In fact, by positioning one satellite over the Pacific, one over the Atlantic, and one over the Indian Ocean the entire earth could be reached. (208). An isolated community could be reached as effectively as a metropolis.

The development of more powerful satellites have made it possible to use much less powerful and less sophisticated earth stations, thus making it economically feasible for small villages to have receivers. If every community needed an earth station of the size and complexity of Bartlett Earth Station at Talkeetna, which cost in excess of five million dollars, the cost would be prohibitive. In contrast, the needed receivers for the ATS-1 programs were not much more complicated than two-way taxi-cab receivers. (211).

Since the synchornous orbit satellites were located 22,300 miles above the equator, they were much too high to be effected by mountains or other types of impassible terrain. (123:1). The weather did not affect their transmission; neither did the presence of the aurora borealis. They were not dependent upon the variable ionospheric layer to bounce the beam back to earth as was the case with high frequency radio transmission. (211).

Satellites had the capability of transmitting in several languages simultaneously. Thus for any given television picture it was possible for some to hear the audio portion in English, some in Athbascan, and some in Inupiat, for example, thus helping to overcome the language barrier. (73:4).

Satellite programming could provide village students with "a frame of reference" to help them "adjust to the more complex town society of Alaska when they attend regional high schools." (176:6). It could help pre-schoolers with earlier exposure to books, counting, and language experiences.

Via satellite communication a teaching expert could present material in one central location that could be relayed to classrooms in many small communities regardless of the number of students enrolled there. (122:9). Thus high school and community college classes could be available which otherwise could not be provided to these areas. Furthermore, provision could be made for interaction of the pupils with each other and with the teacher. (122:10). Questions could be raised and resolved.

Access could also be achieved via satellite to large computer

facilities. (122:16). Thus information retrieval could be an almost instantaneous affair.

Teleconferencing was possible via satellite. (182:2). Teachers could confer with each other and with the Department of Education personnel. Information could reach all teachers at the same time; misunderstandings could be resolved; instructions could be repeated as needed; a much closer relationship would conceivably ensue.

Figure 1 showed a summary of Alaska's needs and a satellite's potential for meeting those needs. One study report expressed it this way,

In many respects a satellite was invented for Alaska because of Alaska's unique communication problem, lack of terrestrial communication facilities, mountainous terrain, harsh climate, and sparse population. These factors point to satellite communication as an ideal system of reaching all parts of the state on a real time (instantaneous) basis. (72:40).

However, having a problem and being provided with the means of meeting that problem does not necessarily mean that the two factors will come together. For example, even though mankind has the potential for feeding the world's poor, this does not assure that they will be fed. Another ingredient is needed, and that is men of vision and action; men who, recognizing both the problems and the potentialities, set in motion the plans and procedures to accomplish the desired goals. The French philosopher educator, Gaston Berger, has said, "Looking forward to the distant future does not mean dreaming and waiting - it means doing at once whatever is in our power to prepare for it." (168:23).

Among persons associated with the early history of satellite communications in Alaska were Augie Hiebert and U. S. Senator Bob

Figure 1

HOW SATELLITES COULD MEET ALASKA'S NEEDS

THE PROBLEM

Alaska covered a vast geographical area.

Many communities were isolated.

Alaska experienced inclement weather.

HF radio depended on variable ionosphere layer.

Alaskans spoke various languages.

Cost of establishing overland communications was prohibitive.

Villagers were unprepared to meet demands of larger cities.

Experts could not travel to all areas to present materials.

There was a high turn-over of teachers.

Retrieval of information was extremely slow.

SATELLITE CAPABILITIES

Satellites could cover an even larger area.

Satellites could reach all communities.

Weather did not affect satellite operation.

Ionosphere layer and aurora borealis had little effect on satellite transmissions.

Broadcasts could be made in various languages simultaneously.

Satellite receivers could be relatively inexpensive.

Properly selected broadcasts could help prepare villagers for life in cities.

Lessons could be disseminated to all areas from a central location.

Teleconferencing could help teachers overcome feelings of isolation.

Access to computer networks was possible via satellite.

Bartlett. Mr. Hiebert had been active in Alaska communications from his youth when he managed radio station KFAR which began broadcasting in Fairbanks in 1939. He had seen the beginning of radio in Anchorage in 1946, the coming of television to Anchorage and Fairbanks in 1953 and 1955, respectively, and was keenly aware of the developing satellite technology. This he felt, would be ideal for Alaska since there were, "no fade-outs, no geographical barriers, no distance barriers". (211). In 1966 Mr. Hiebert talked to Senator Bartlett regarding the possibility of an earth station at Alaskaland in Fairbanks for the Alaska centennial the following year. This did not materialize, but planning and thinking was directed towards Alaska's use of satellites. Mr. Hiebert became the chairman of the Alaska Satellite Communications Task Force established by Governor Miller.

It was Senator Bartlett who, in 1968, wrote to NASA questioning their plans to put the ATS-F into service in India when there were American needs not being met. (190). This eventually led to NASA's allowing American use of the ATS-6 in an experimental program which included Alaska, prior to their Indian commitment.

Alaska's other U. S. Senator, Mike Gravel, worked tirelessly to bring education via satellite to Alaska. In July of 1969 he outlined a plan for a pilot program using ATS-1 with available ETV programs. In May of 1969 there was a press release from his office stating, "We must move ahead as quickly as possible to provide a satellite system...". (202).

An article in the Tundra Times of Fairbanks of July, 1971, said, "Three years ago some far-thinking people at the university (University

of Alaska) began eyeing the ATS-1." The article continued to tell about Glenn Stanley, Robert Merritt and Robert Arnold. Mr. Stanley was quoted as saying, "Happiness is a working satellite." (89:3). Robert Merritt designed and built the first of the small experimental ground stations that were to become a unique feature of the Alaska experiments.

Meanwhile, Harold Wigren of the National Education Association and Henry Cassirer of the United Nations worked cooperatively to provide a study of Alaska's educational communications needs. This study, published in 1970, was entitled, "Alaska: Implications for Satellite Communications for Education". (102).

These men provided the main impetus for bringing satellite experimentation to Alaska; they provided the main impetus for designing a system that would help to alleviate Alaska's great need for better educational communications. Among them were politicians, journalists, educators, and technologists. (Among them were not the people who would especially benefit from the experiments, i. e. villagers and "bush teachers".)

Chronology of Major Events

The ATS-1, launched December 7, 1966 from Cape Canaveral, (73:11), attained geosynchronous orbit above the equator over the Pacific Ocean. In Alaska, groups like the University of Alaska, the Division of Communications of the Department of Public Works, the Alaska Educational Broadcasting Commission, and the Department of Education were quick to recognize the satellite's potential for meeting the state's desperate communications needs and for enhancing its educational program. As early as

1968 a Satellite Task Force was established to coordinate the efforts of the above groups. A formal proposal for a "Satellite Communications Demonstration for Alaska" was submitted to NASA by the Division of Communications in 1969. (123:2).

Then in 1970 came the first demonstrations of the ATS-1 in Alaska when KUAC began transmitting public radio programming to the Lower 48 (123:2). This was the same year that an extensive study of Alaska's communications needs was conducted by a team from NEA and UNESCO. (102). The Geophysical Institute of the University of Alaska began experimenting with earth stations at Juneau, Anchorage, College and Sheep Creek. (162:III-24).

In the spring of 1971 the Geophysical Institute obtained a contract with Lister Hill Biomedical Institute for the procurement, installation, and operation of twenty-five small ground terminals or receivers. (176:3). This was later expanded to include amplifiers into the schools and the way was paved for educational broadcasting via satellite to remote classrooms.

Two more studies were made in 1971 - one through the joint sponsorship of the Alaska Department of Education and the Ford Foundation entitled, "Educational Communications in Alaska", (115), and the other by the Federal Field Committee for Development Planning in Alaska entitled "Economic Outlook for Alaska". (123). Both emphasized "poor communications as Alaska's primary inhibitor to social and economic development." (123:4).

In mid 1971 the Alaska Education Telecommunications Consortium (AETC) was formed consisting of representatives of many organizations

and agencies interested in satellite communications. Its purpose was to gain input from various sources to guide the planning and development of educational broadcasting via satellite. In May of 1971 Alaska's proposal for an "Action Study of Educational Uses of Satellite Telecommunications in Remote Alaskan Communities" was presented to NASA. Approval was received in early summer and by October two hours of educational broadcasting was transmitted each week from KUAC into the villages. Programs were planned and presented by various members of the consortium.

The ATS-1 continued to be available to Alaska for a few hours per day. Its "use has been primarily medical, with occasional educational users, and has been coordinated by several native regional corporations serving specific cultural regions". (123:6). Among the users of ATS-1 from 1972 through 1975 was the National Education Association which sponsored regular teacher programs among rural and urban communities, even expanding to include some teachers in the South Pacific. (177 and 183).

In the meantime, correspondence had also been exchanged regarding the possibility of Alaska's inclusion in the ATS-F programs. In 1972 Alaska requested planning money from the U. S. Department of Health, Education and Welfare with a proposal, "A Proposal to Develop a Plan for Alaska's Unique and Innovative Education Demonstration Employing ATS-F". (124).

Also in 1972 a "mini-TV" experiment was conducted in St. Paul, Unalaska, King Cove, Fort Yukon and Sand Point. Low-powered transmitters broadcast public programming supplied on cassette tapes. These were not received via satellite, but the experiment pointed to a way of

getting satellite television into individual homes from the earth station terminals when telecommunication via satellite became a reality. (123:8).

A similar experiment was carried out the following year in Wales, Alaska, this time using a two-channel cable distribution system, and demonstrating another possible method of distributing satellite communications into the homes.

Negotiations and planning re the ATS-F continued in 1973. In Alaska the Governor's Office of Telecommunications (OT or GOT) was established "to provide the state with a focal point for communications policy development and liaison between the state's users and communications vendors." (123:8). At the national level the National Institute of Education (NIE) became the group within the Department of Health, Education and Welfare for federal supervision of the ATS-F demonstration. NIE representatives made visits to the Alaskan sites proposed for ground station location; OT personnel went to Washington D.C. for conferences. Pursuant to the NIE's acceptance of OT's proposal and the letting of the contract for OT to operate the ATS-F experiment, consumer committees began to meet, programs were being planned, and subcontracts were given to the Northwest Regional Education Laboratory to provide program scripts and to station KUAC to produce them.

Early in 1974 a contract was let to KUAC to install and maintain the technical equipment in the Fairbanks area, and the technical division of the OT began installation of the small earth stations capable of receiving visual as well as audio transmission. Then on May 30, 1974, the ATS-F was launched and became known as the ATS-6 when it achieved its orbit. (73:3). Television broadcasting in Alaska began in October

of 1974, using ATS-6 for video and ATS-1 for audio, and continued through May of 1975. The program was known as the Educational Satellite Communication Demonstration (ESCD). Almost one hundred hours of programming was designed, produced and broadcast.

Instructional programs were available to 1200 rural school children, K-5th grade, and 150 rural Alaskan educators. Additional programming was accessible to 9,000 Alaskan village residents, young and old, as well as the 50,000 residents of Fairbanks. (123:10).

Then, as previously arranged, the ATS-6 was moved into a position over Africa for use by India for approximately one year. The OT has been active in exploring possibilities for continuing education via satellite by means of other space vehicles such as CTS (a NASA-Canadian owned satellite), F-1 (launched in December of 1975 by Radio Corporation of America), the ATS-G (which will not be launched due to NASA's phasedown of communication satellite experiments), or via the ATS-6 after its return from India.

Figure 2 showed a time-line of the major events which transpired prior to 1976. This was an outline of the experimental phase of Alaska's involvement in education via satellite.

Educational Programs Via ATS-1

The major educational broadcasting effort via the ATS-1 in Alaska was the "Action Study of Educational Uses of Satellite Telecommunications in Remote Alaskan Communities", commonly referred to as just the "Action Study". Two or three hours per day of satellite broadcasting was aired from October 1971 through June of 1974. During the 1974-75 school year the ATS-1 was used for the interaction phase of the ATS-6 ALED experiment.

Figure 2
TIME-LINE OF MAJOR EVENTS

Pre- 1970	ATS-1 launched Satellite Task Force established Proposal "Satellite Communications Demonstration for Alaska"
1970	KUAC transmits NPR via ATS-1 to Lower 48 UNESCO/NEA study Earth station experiments
1971	Ground stations for ATS-1 installed Study, "Educational Communication in Alaska" Study, "Economic Outlook for Alaska" AETC formed Action Study proposal for ATS-1 Action Study broadcasting began in October via ATS-1
1972	Action Study continues NEA Satellite Seminar begins in September OT proposal for funding to plan ATS-6 participation Mini-TV project
1973	Project Wales GOT established NIE to handle ATS-F educational programming Contract with NIE for ESCD or ALED Consumer Committees began to meet NWREL to make program scripts KUAC to produce programs
1974	Technical equipment, small earth stations installed for ATS-6 ATS-F launched on May 30 Onow called ATS-6) Utilization aides hired ESCD broadcasting began in October
1975	ESCD completed in June ATS-6 moved to new location OT continues evaluation and planning for future

The State of Alaska's goals with regard to the use of ATS-1 were stated as being:

1. To gain experience in the use of a medical, educational, and informational interchange between remote and urban locations.
 2. To isolate the advantages of satellite telecommunications.
 3. To develop in-house (in Alaska) satellite communications competence.
- (100:3).

Small ground stations had been located in twenty-five communities to serve the needs of the Biomedical experiments. To accommodate the educational experiments a remote amplifier and speaker were installed in the school facility. The names of these sites were listed in Figure 3; their locations can be seen on Map 1.

The Action Study was managed by a Project Director hired by the Alaska Office of Telecommunications with funds received from the National Institute of Education. The Alaska Educational Broadcasting Consortium acted in an advisory capacity. Members of the consortium became prime program producers and often provided funding for these programs through their own agencies. Program series have been produced by the Tanana Chiefs, the Alaska Library Association, the National Education Association and the Alaska State Operated School System, for example.

In reviewing the monthly schedules that have been distributed to participants and the daily logs that have been kept by the program manager, broadcasts for three target audiences emerged: teachers, students and villagers. In-service programs for teachers, classrooms units for students and news releases for adults were the main types of programs attempted. Some of the educational program time was reserved for experiments other than specific programs: there were exchanges

Figure 3

SUMMARY ATS-1 EDUCATIONAL EXPERIMENTS

TITLE: "Action Study of Educational Uses of Satellite Telecommunications in Remote Alaskan Communities" or "Action Study"

DURATION: October 1971 - May 1974

SITES:	Allakaket	Anaktuvik	Arctic Village
	Barrow	Barter Island	Beaver
	Chalkyitsik	Emmonak	Fort Yukon
	Hooper Bay	Hughes	Huslia
	Koyokuk	Nulato	Ruby
	Stevens Village	Saint Paul	Tanana
	Venetie	Fairbanks	Juneau

SPECIAL FEATURES: consortium
low-cost receivers
interaction

MANAGEMENT:

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  NASA ----- NIE
                |
  AEBC ----- | ----- Consortium
                |
                Project
                Manager
  
```

FUNDING: Satellite time from NASA
Receiving equipment from the Biomedical Project
Programming from consortium members
Project Manager and supporting personnel from NIE

PROGRAMS: In-Service Education
Classroom Units
Village News and Information
Administrator-Teacher Exchange
Student or Patient to Home
(Biomed Traffic)

SCHEDULE: Monday through Friday 2000-2100 and 0500-0700 (z) (with some variations)

MAP 1
ATS-1 SITES



between certain schools, teleconferencing, and ordering of materials. This type of satellite use will be considered in another section of the paper.

One agency which produced in-service type programs was the Alaska Rural Teacher Training Corps. Many of its programs dealt specifically with problems of "bush living" which teachers might encounter. The Alaska Library Association presented one series especially for librarians and library aides, in the form of a seminar with college credit if desired. A "Speech Series" and "Health Talks" were aimed at enabling the teachers to assist pupils with special problems. Prior to the introduction of a new classroom series a teacher orientation program was often scheduled in which the format and goals of the new program would be discussed. (152:31-47).

Another agency that has specialized in teacher programs via satellite was the National Education Association (NEA) and its Alaska affiliate, the Alaska Education Association. The NEA believed that teachers, not industry or government agencies should have a leadership role in planning and producing programs. (183:xi). Therefore, it was to serve teachers with information, to give them experience in planning and producing programs, and to make use of their expertise in the development of this new technology, that the NEA became involved in satellite communications for education.

One NEA program the Satellite Seminar, began in 1973 as an "informal roundtable of the air" allowing teachers to exchange ideas. (177:5). Later the format was changed to a formal credit course con-

ducted by the University of Alaska. Participants received pre and post session materials and were required to return considerable paperwork in order to gain the three graduate credits offered. Topics included in the seminar were individualized instruction, open classroom, non-gradedness, and teaching strategies for the culturally different. (204).

The NEA/Alaska Hour, referred to as NEATS (News Every Alaskan Teachers Seeks), was also presented during the 1973-74 school year. (177:6). This series of seven monthly programs contained materials of professional interest to teachers such as accountability, merit pay, voucher plan, copyright laws, and decentralization of the State Operated School System. Also included were topics aimed at "building a closer relationship (within the NEA) between its elected leaders in the field and state and national association leaders", (177:7), such as Delegate Assembly and the NEA Constitution.

The NEA's next series was entitled NEASAT or NEA Satellite Alaska-Hawaii Association Hour, a continuation of NEATS, but now expanded to include Hawaii. The program format included mini-presentations, a panel of "experts" to answer questions, and discussions by the various participating groups. Discussion questions were distributed in advance and participants were encouraged to offer their own ideas and questions. Tapes of broadcasts were available upon request. (177:7). Topics discussed included multi-graded situation, cultural pluralism, student participation and innovative practices. (177:14). Bi-weekly programs were presented from October through May of the 1974-75 school year. This series was considered a unique experiment in that it was "planned by teachers, for teachers, implemented by staff with teacher input, and

evaluated by teachers." (177:7).

For the 1975-76 season plans were to continue the NEASAT format, but to expand it to include Appalachia and other areas of the Pacific Basin besides Hawaii. This series was called the NEA's Pan-Pacific Satellite Experiment. Thus programming had become international inasmuch as participants included teacher leaders from New Zealand, New Guinea, Fiji Island, and the Solomon Islands as well as Alaska, Hawaii, and states in the Appalachian region. The experiment covered ten time zones (183:6), and was accomplished by the interconnection of the ATS-1 over the Pacific and the ATS-3 over South America. Even the planning for the series was carried out via satellite in a teleconference. (183:5). Topics agreed upon included teacher evaluation, in-service education, metrics, teaching in rural areas and values education. (183:9).

One of the first series to be broadcast into the classroom was a Social Studies one featuring events of special interest to Alaskans such as salmon fishing, caribou hunting, Alaska Native games, trapping and dog mushing. Packets containing pictures, maps, and activity suggestions had previously been distributed to the schools, but the "instructional program broadcast live provided Alaskan teachers the fresh material needed to stimulate students". (100:19). Two outstanding programs in this series were the Nulato Stick Dances and Whaling in Point Barrow.

"Ookpik, the Arctic Owl" was a favorite of the children, featuring an owl-like character who visited various animals. In the dialogue interesting information was given about the appearance and habits of these animals. Thus, the thirteen quarter-hour stories were actually nature studies. Language Arts programs consisted of taped stories told

by Native story tellers about Eskimo and Indian legends, and modern stories like Nancy Drew and the Hardy Boys read by a librarian.

For the Junior High and older young people there were programs about ecology, consumer education, home economics, social problems, and higher education services. Occasionally, special features such as "All About the A7S-1" or "Halloween" were presented.

The evening programs were aimed at the villagers, but often children and school personnel participated as well. The Fairbanks Library originated two program series, "What Do You Want to Know?" and "The Village Circle Story Exchange". The subject matter for the first series was extremely varied - from rock formation, to recipes, to fire prevention, to flower growing - presented in response to the question "What do you want to know?" In the "Village Story Exchange" persons from the villages were invited to tell stories, a favorite pastime. These were often taped for rebroadcast into the classroom, resulting in a collection of tapes of native stories which can now be checked out through the Alaska State Library. (221).

The Fairbanks Native Community Center produced programs about the facilities available to villagers when they come to the "big city". The Tanana Service Unit Board of Health discussed village health problems and introduced health personnel to villagers. The Alaska Federation of Natives had programs about housing projects, its convention, and otherwise shared information of interest to villagers. "Crossroads in Time", a series KUAC had taped prior to satellite availability, was a group of thirteen radio programs about Athabascan Indians covering such subjects as racial prejudice, economic opportunities, and education.

Programs featuring current news were a part of each evening broadcast. Several series such as "The Week that Was", and "This is Your Alaska" were produced locally, and the National Public Radio program, "All Things Considered", gave national news.

"All Things Considered" is a one and a half hour public affairs program originated in Washington D. C., utilizing reports from throughout the United States and the World...This program received by satellite was the only program of this length and depth received in Alaska on a daily basis. (100:21).

Not only did Alaska receive these programs, but certain Alaska subjects were sent by KUAC to the network, and these could also be heard in this state. "Without the satellite feed any reports provided to NPR by Alaska sources could not be heard in Alaska". (100:22).

Educational Programs via ATS-6

The ATS-6 was used mainly for one experiment during this time in Alaska, The Education Satellite Communications Demonstration (ESCD), sometimes referred to as the Alaska Educational Telecommunications Experiment (ALED). This experiment was one of three conducted simultaneously by the NIE "to determine if using a satellite is a feasible way to get educational information to and from people in isolated rural areas". (46:reprint). NIE's other experiments involved Appalachia and the Rocky Mountain region. Figure 4 provided a summary of ALED, the outline of which was used in this discussion.

Programming began in October of 1974 and concluded in May of 1975, thus it continued a little less than one school year. The preliminaries, however, began much earlier - several years before the actual launching of the satellite in 1974. First, satellite time had to

be arranged with NASA. Then funding had to be secured for the planning and writing of the programs. Also sites had to be selected and the equipment installed.

The general management of the program was under the Governor's Office of Telecommunications which appointed a Satellite Experiment Coordinator having over-all responsibility, an Educational Experiment Manager in charge of programming, a Utilization Manager in charge of Utilization Aides, and a Technical Manager in charge of installation and operation of the system. (116:5).

Special features of ALED included technological innovations and village involvement. (161:I-8). Technological innovations, consisting of interaction, inexpensive receiving equipment, color video, and four language channels, will be discussed later.

One method of village involvement was to have each participating village select a representative to serve on a Consumer Committee. These committees met with the program designer to ensure that the programs would be appropriate for the intended audiences. (161:I-14). Prior to the broadcasting, the committees helped set up goals for each program, selected specific topics, and reviewed scripts, characterization and settings. They also met during the course of the broadcasts to evaluate the effectiveness and cultural suitability of the programs. (116:2).

Another method of village involvement was the hiring and training of one person at each site who was to "publicize program schedules, gather data, and to ensure that equipment was operating adequately and would be handled properly and consistently by a single village resident trained in its use." (163:I-5). The aides were usually in charge of

Figure 4

SUMMARY OF ATS-6 EDUCATIONAL EXPERIMENTS IN ALASKA

TITLE: ESCD/ALASKA (Education Satellite Communications Demonstration)
or ALED (Alaskan Education Telecommunication Experiment)

DURATION: October 1974 - May 1975

SPECIAL FEATURES:

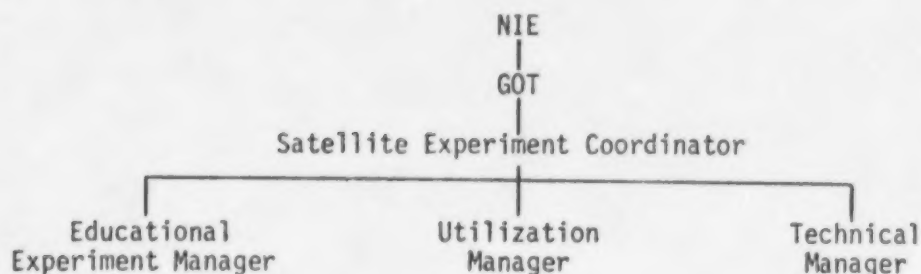
Technological:

- interaction
- color video
- four language channels
- inexpensive receiving equipment

Village Involvement:

- consumer committees
- utilization aides

MANAGEMENT:



PROGRAMS:

Title	Subject	Schedule (z)
"Amy and the Astros"	English	M. & F. 2000-2030
"Right On"	Health	M. & F. 1930-2000
"Alaska Native Magazine"	Public Affairs	T. 0400-0500
"Tell and Show"	Teacher Training	Th. 2445-0115
"Experiments of Opportunity"	Various	Th. 2345-2415
("WAMI")	Medical Training	T. & Th. 1700-1800)

SITES:

Video/Audio Transmit and Receive - Fairbanks, Juneau

Audio Transmit and Receive; Video Receive not Transmit - Anchorage, Petersburg, Valdez, Angoon, Nenana, McGrath, Craig, Aniak, Yakutat, Allakaket, Minto, Nikolai, Sleetmute, Chuathbaluk, Tanana, Galena

the interaction or viewer participation part which followed broadcasting.

One responsibility of the Governor's Office of Telecommunications was the selection of sites wherein the equipment should be placed and thereby determining which sites could participate in the experiments. The ATS-6 footprint did not cover the entire state as can be seen by Map 2; in fact only 63 of the state's 270 communities were within its boundaries. (118:39). The following guidelines were used in determining which localities were to be included:

1. The anticipated significance of satellite technology in meeting the needs of the site.
2. A population large enough (perhaps 150 persons) to develop ample data.
3. The degree of interest shown by prospective participants in having a part in the experiment.
4. The availability of a school, community hall, or other facility suitable for public use.
(121:9).

Thirty-five sites were at first suggested, but this was narrowed down to 17 receiving sites and two television sending sites (all sites would have two-way radio capability via ATS-1). The two transmission points would be Juneau and Fairbanks. For the names of the other sites see Figure 4 (P. 68) or Map 2 (P. 70).

Two types of programs were produced: one group for children and one for adults. For children three areas were considered, Early Childhood Education, Basic Oral Language Development, and Health Education. For adults there were the Teacher in-Service Training, a Viewer Defined Program, and a National News Program.

Of the three children's programs Early Childhood Education was dropped in the planning stages due to funds limitations, leaving the remaining two programs for elementary aged children. These were then

MAP 2
ATS-6 SITES



broadcast during the school day into the schools.

The Basic Oral Language Development series, sometimes referred to as BOLD, was aimed at five through seven year old Alaska Native children, "whose first language is not English, and/or whose English is limited to the rudimentary needs of the home and classroom." (117:3).

The basic goals of the program were:

1. Help the student acquire and develop the English oral language skills necessary to communicate effectively.
 2. Aid the student in building a good foundation of English proficiency upon which to base future successful achievement in reading, writing, and the more complex processes of thinking such as concept formation, problem solving, and abstract reasoning.
 3. Encourage the student to develop an understanding of a different culture and be able to function within it without losing personal identity in their own culture.
- (116:2,3).

The setting for the program was inside a spaceship, where two astro children and a robot (puppets) who have come from outer space, were being taught English by an Alaskan woman (live person) who inadvertently discovered the spaceship. The program was popularly known as "Amy and the Astros". The children of the audience became involved with helping to teach the outer space children, thus there was considerable repetition of phrases and sentences on their part.

One program was shown twice each week giving some flexibility in choice of listening times for the audience. A total of thirty-two programs were produced, which are now available through the Alaska State Library. (219).

The other broadcast for elementary aged children was a health series called "Right On" using thirty-two "canned" or rented programs and thirty-two new Alaskan-produced ones shown alternately. This was to

help "determine the feasibility of utilizing existing programs rented from various companies 'in the lower 48'". (117:2).

Three main health areas were considered: physical health needs, mental health needs and habits (hygiene and safety), with their stated goals being as follows:

1. Promote good health habits.
 2. Encourage positive health attitudes.
 3. Help students develop a good self concept, pride and cultural identity.
 4. Promote good safety practices.
 5. Develop knowledge of the body and its functions.
- (116:3).

The Alaskan produced shows had a typical village health aide's office as its setting with interaction between the aide (live person) and a moose, beaver, and germ (puppets). Each program centered around one specific health problem. They were written by staff from the Northwest Regional Education Laboratory and produced by staff in the studios of the University television station, KUAC. (236).

One of the adult programs was aimed at teacher training called "Tell and Show". This consisted of a series of lectures by Dr. Rudolph Dreikurs entitled "Motivating Children to Learn" as well as round-table discussions, studio interviews, panel discussions and slide presentations. The series gave teachers an opportunity to share ideas and teaching materials. Thirty-two once a week half hour shows comprised this series.

The National News program did not materialize due to technical and funding difficulties. A unique experiment in broadcasting for adults was the Alaska Native Magazine, "a sixty minute public affairs program devoted to news and events that affect Alaska's natives".

(117:2). The consumer committee for these broadcasts represented the Alaska Federation of Natives and each of the Native corporations within the satellite footprint.

One feature of this series was that broadcasts were not only in English, but also in Yupik and Koyukon on simultaneous audio channels. The format included in-studio interviews, on-location films or slides, and documentary type programs, which were at times interspersed with broadcasts of special state, national or international events. Some of the topics for these broadcasts have been dog-sled racing, Alaska Native Claims Act, fishing, resignation of President Hixon, native corporations, pipeline impact, inauguration of Governor Hammond and vocational opportunities.

During live broadcasts of the Alaska Native Magazine it was possible to have direct interaction from the audience via the two-way audio capabilities of ATS-1. Not only at the end of the program was there the opportunity to respond, but during the actual broadcast villagers could call in questions that could be immediately answered by the program host or any guest present.

A weekly thirty minute slot was set aside for what has been called "Experiments of Opportunity" designated for use by other agencies which would be willing to create and fund programs. Among those which participated were the Department of Regional Affairs, the Department of Fish and Game, and the Alaska State Library. Programs presented by the Department of Regional Affairs were about the operation of the Alaska State Legislature including news about current legislative actions; the Department of Fish and Game showed wild-life movies; the Alaska State

Library programs were in conjunction with a correspondence course for librarians or library aides, which was even available to persons outside the ATS-6 footprint by means of video-tape copies of broadcasts. (50:4).

Another series for adults, broadcasting via ATS-6, was called WAMI. The initials refer to Washington, Alaska, Montana and Idaho, and is a cooperative venture of these state universities to provide training for medical students. WAMI was generally included among medical experiments of ATS-6, but mention of it was made here because much of their satellite use was specifically instructional. Hour-long broadcasts were made twice a week from January through June of 1975.

Basic Science and Clinical Medicine were the two types of programs presented. The former was described this way:

The basic science involves the faculty of the University of Washington in Seattle and the students and faculty at the University of Alaska at Fairbanks. The participants at these sites can see and hear each other via a television link through the ATS-6. Lectures, demonstrations, and classroom experiments originate at both campuses and are relayed through the ATS-6. (51:541).

At one time there was a "computer-aided evaluation program which allowed Fairbanks students to measure their own proficiency." (67:19). The Clinical Medicine Course consisted of a presentation of patients with a discussion as to diagnosis and treatment. Another aspect was the continuing educational program for physicians in rural areas.

Informal Communications

Besides being vehicles for regular scheduled programs satellites have been used for other informal types of communications. This was particularly true for the satellite radio, the ATS-1, which has been used for conversations, teleconferencing, exchanges between rural Alaskan

children and students in the lower 48, ordering materials, disseminating information and biomedical traffic.

One type of conversation was that carried on by a parent and a child who was either away at the hospital or away at boarding high schools. (152:45,46). In the 1973-74 school year eight time slots were dedicated for parents to visit with boarding school students. (154:68). This was to help fulfill one of the stated purposes of the Action Study, namely, "to help ameliorate the effects of separation of the child in hospital or boarding school from his family". (152:11).

Some satellite radio time had been set aside for the ordering of materials, especially from the State Library following some of their broadcasts. This led to an immediate response regarding the availability of the desired items, and the assurance that these would soon be on the way if available. In this way classrooms were also able to request or trade books with each other.

Classroom exchanges have been conducted between Venetie and Chalkyitsik, Alaska, and a school in Barstow, California. (152:46). The following year classroom exchanges became international in that school children of Beaver and Barrow, Alaska, and those of Honolulu, Hawaii, and Wellington, New Zealand were involved. After the children overcame their initial hesitancy in speaking with strangers so far away, the exchanges resulted in heightened appreciation of each other's way of life. (154:59).

The satellite radio was used for administrative communications, especially where village schools had no other radio contact with their headquarters, or where the radio reliability was very low. The Tanana

Service Unit was one area that benefited from this usage.

Due to the conferencing capabilities of the satellite radio it is possible for a school administrator to make a point to all of his teachers at the same instant...This is a valuable tool recognized and used by the past two Tanana area administrators...the satellite radio has provided the Tanana Area Schools with a dialogue mechanism unavailable usually for the urban schools of Alaska except through the cumbersome task of coming together in meetings. (154:50).

One advantage of teleconferencing was that response could be immediate and therefore misunderstandings can quickly be cleared up. One difficulty was the lack of privacy; anyone of the sites could listen in to the conversations. "On ATS-1 the feeling of being eavesdropped on is far greater than with shortwave sideband - this inhibits professional exchange between teachers." (153:108). Occasionally time was taken up with house-keeping matters that could have been resolved at the local level. Unfortunately, "teachers have used the administrative hours as an opportunity to vent their real or imagined grievances against the State Operated School System." (152:40).

Running concurrently with the satellite educational program was a satellite biomedical program. The latter operated under a separate funding structure, with its own management system, and was only peripheral to this study. However, mention of it was made here because it was one way in which satellites have been used for educational purposes other than broadcasting of specific programs. Exchanges between the medical aide and the nearby doctor or nurse about village health problems or individual diagnosis or treatment have had considerable educational value, especially since these conversations could be heard by all who were tuned in. There was the problem of confidentiality via satellite and some aides preferred to use the telephone or non-satellite radio if

such were available. Medical traffic had certain designated times, but it also had priority over other programs; thus it was not unusual for a scheduled program to be interrupted by a medical emergency.

Evaluation

Evaluation played an extremely important role in the early history of satellite communications for education in Alaska. These programs were termed experiments or demonstrations, and the results of the experiments were determined by the use of various evaluation methods or tools. As Walter Parker, who was in charge of evaluations for the ATS-1 Action Study put it, "It is imperative that evaluation be obtained since this is a test program and such a record is vital to our understanding of what is going on." (152:8). Among the tools or instruments used in evaluation were interaction, reports from utilization aides, interviews, questionnaires, tests, and evaluation meetings.

One unique feature of the satellite experiments was the capability for interaction, for user response immediately following a broadcast or occasionally during the program itself. A record was kept of the number of responses to each program, as well as the number of responses from each individual participating site. In some cases this was accomplished by means of a "roll-call" - asking each village to respond in turn (if they were listening); usually responses were voluntary or spontaneous. One drawback with this as a method of evaluation was that the very nature of some programs would elicit more response than others: a current or controversial political issue would lend itself to greater discussion than would a symphony concert, for example. Another drawback was the natural shyness or hesitation, especially on the part of native

villagers, to respond when they knew their comments would be heard "all over Alaska". Also, the very operation of the equipment, although it involved only pushing a couple of buttons and speaking into a microphone, was an inhibiting factor for some. Nevertheless, this method did result in securing some objective quantitative measure of interest and participation.

Utilization Aides were expected to keep logs and send in attendance reports as well as advertise programs and operate the equipment. Apparently several did not actually send in reports, or did not realize that this was one of their duties, since from some areas no, or at best sporadic, reports were received. However, many of the aides sent in complete, regular reports.

During the course of the Alaska experiments with education via satellite interviews were widely used as an evaluative tool. Interviews were conducted by utilization aides, especially hired interviewers, production and management staff and technicians. The villagers were most responsive to native interviewers, tolerant of others but often reticent in expressing their honest opinions. One team of interviewers from the National Institute of Education was not well received and caused some antagonism according to the report of the Practical Concepts Incorporated. (161:V27-30). As a result of the interviews there existed a profusion of statements, pro, con and indifferent, that were a little difficult to organize, but which were analyzed to determine the existence of general trends.

Before and after tests with control groups were not often used. In 1973-74, the last year of the Action Study, some attempt was made to

use standardized achievement tests (Iowa Basics) to see whether there were any significant difference in achievement of pupils in the sites with satellite radio and those without, or between sites with high participation and those with low participation. The validity of such a procedure might be questioned since the Iowa Basics did not specifically test the subject matter presented via satellite radio. There was the possibility that a superior or more enthusiastic teacher would be more apt to use a new technology; hence it is difficult to determine whether higher test scores were the result of the use of the technology or the result of having a highly motivated teacher.

Another method might be termed securing a "compendium of user reactions". At the conclusion of the ATS-6 project, an evaluation meeting was held at which time utilization aides, consumer committee members, and teachers each met in separate groups for a brainstorming session. Guiding questions were available to the group leaders but these were used only if there were a lag in conversation. These questions could in themselves influence responses. For example, the question, "How can control of Alaska rural media be delivered to the villages?" (161:III-9) indicates a presupposition that this control is advantageous. Seven hours of taped comments resulted from each group, which were analyzed according to three major areas or questions, namely,

1. What requirements do rural Alaskans place on a television system?
 2. How can control of Alaska rural media be delivered to the villages?
 3. What lessons have been learned about programming?
- (161:III-9).

The analyzers admit that, "Arriving at findings on the basis of disorganized verbal data is not a purely systematic, scientific process."

(161:III-8). There were no attempts to put a statistical interpretation on the findings; instead, for each pro statement recorded, they tried also to find one of the opposite view. There were "thirty-nine findings" which "were boiled down" to "thirteen recommendations". (161:III-10).

Questionnaires were sent out by some participating agencies such as the National Education Association, the Alaska Library Association and the State Operated School System about their particular programs. Teachers and villagers had been subjected to so many forms, surveys and questionnaires that they often did not respond to those which were voluntary. Consequently, the number of returns was extremely low. In fact, when "the DOE (Alaska State Department of Education) sent out an evaluation questionnaire along with a newsletter on the Teacher Inservice Training series, only two were returned." (161:V-48).

Clearly, there were drawbacks to each evaluation method; nevertheless, each resulted in some assessment as to support, criticism, or indifference. The fact that there was such a variety of methods used tended to give validity to the overall findings. In considering what these overall findings were the strengths, weaknesses and possible solutions were identified.

Judging by the number of responses to the programs in the Action Study, Figure 5, it can be seen that the programs eliciting the greatest number of responses were the Health Programs, the NEA Seminar, and the NEA/Alaska News, while those generating the least were the Story Hour, Village Information, AKLA (Alaska Library Association) Information Exchange, and This is Your Alaska. One encouraging trend was that the average number of responses increased each year, a 21% increase from the

Figure 5

AVERAGE INDICATED RESPONSE TO PROGRAMS VIA ATS-1

Type of Program	Average Number of Responses Per Program
<u>1971-72</u>	
Health	5.6
Native Claims and Programs	4.3
What Do You Want to Know (Library)	3.5
Village Story Hour	3.1
School Administration	4.5
Native Culture	3.6
Village Information	2.5
Teachers Idea Exchange	4.4
Program Development	4.7
Patients and Students to Parents	4.7
News	4.9
Average	4.2
<u>1972-73</u>	
Teachers and Administrators	6.25
Story Hour	2.0
Village News	3.6
NEA Seminar	6.0
Native Reports	2.4
Classroom Units	3.5
Tanana Board of Health	4.5
Library Exchange	4.5
AKLA Information Exchange	2.0
Average	4.3
<u>1973-74</u>	
Teachers and Administrators	6.8
NEA Seminar	7.1
NEA/Alaska News	7.8
South Pacific Exchange	3.1
AKLA (Library)	3.8
Home Economics	5.5
Social Problems	4.4
Ecology	3.6
Native Stories	1.2
Special Reports	5.5
This is Your Alaska	2.1
Tanana Chiefs	5.9
Boarding Home Students to Parents	4.9
Local News	4.6
Average	5.1

Source: "Village Satellite I," 1972 (152)
 "Village Satellite II," 1973 (153)
 "Village Satellite III," 1974 (154)

1971-72 school year to the 1973-74 school year. The number of responses did not necessarily indicate the number listening, but it did indicate interest.

Studying the table of average audience size of the ALED ATS-6 programs, Figure 6, it can be seen that there was little difference in the numbers who viewed the two classroom programs, that the Alaska Native Magazine program was seen by students as well as the villagers, and that in six of the fourteen villages the teachers did not participate in the teacher training programs.

In general it can be said that the number of participants in the classroom programs of the Action Study was light (100:31), while more classrooms were involved with the ALED programs (table 8). The Action Study was audio only and this did not generate the same enthusiasm that the audio/visual concept did, especially since children had been exposed to movies, slides and video tapes previously.

The study of Iowa Basic Skills Test results for the 1973-74 school year of pupils in the Action Study schools showed that there was

a rather high relationship between high test scores and satellite participation in at least six villages. Further identification of trends is not possible at this time, nor is it possible to isolate the use of radio from the other inputs to the classroom at this time. (154:84).

Occasionally programs advertised did not materialize, generally due to failure of the person responsible for the program to show up. When this happened more than once in any series the program lost its credibility and the audience dropped off. This may account for the low response to the Tanana Chiefs programs, for, in the 1973-74 broadcast season, they presented 18 but missed 12 of their scheduled programs. (154:67).

Figure 6
AVERAGE AUDIENCE SIZE PER PROGRAM
ATS-6 DEMONSTRATION

SITE	HEALTH "Right On"		LANGUAGE ARTS "Amy and the Astros"		TEACHER INSERVICE TRAINING	ALASKA NATIVE MAGAZINE	
	Adults	Students	Adults	Students		Adults	Students
Allakaket	6	44	6	41	0	29	38
Angoon	4	50	4	49	0	16	4
Aniak	3	12	3	15	1	7	1
Chuathbaluk	4	37	4	37	0	11	13
Craig	3	91	3	91	0	0	0
Galena	3	23	3	23	0	7	5
McGrath	3	27	2	27	3	8	6
Minto	4	39	4	36	0	5	2
Nenana	3	53	3	53	2	6	5
Nikoli	2	29	2	29	2	14	12
Petersburg	4	58	4	53	2	113	60
Sleetmute	4	30	4	30	3	15	18
Tanana	3	30	3	20	2	17	13
Valdez	5	102	5	100	2	3	0
Yakutat	<u>2</u>	<u>32</u>	<u>2</u>	<u>38</u>	<u>3</u>	<u>4</u>	<u>4</u>
Totals	53	657	52	642	20	255	181

(Also approximately 638 adults watched ALASKA NATIVE MAGAZINE over KUAC in Fairbanks.)

SOURCE: ATS-6 Health/Education Experiment: Alaska Education Experiment. Vol. I Final Report (118:91)

83

Another problem of the Action Study was that it failed to complete a full year's broadcasting in any year. Late, indefinite or insufficient funding was blamed for the Action Study beginning in October the first year, and in January of the next school year. In the final year it began in September with a funding grant that lasted for six months. The funding was later extended, but this uncertainty had a detrimental effect on programming and participation. The ALED did not complete a full school year either, since broadcasting began in October.

There were varying reports as to the clarity of the media. At first the Action Study was plagued by poor reception; it took time to make the proper adjustments in a new system. Then because of the Apollo space mission they had to operate on half power for some time. (153). In the evaluation by the state of Alaska was this statement, "Initial failures were due to the poor technical quality of the satellite radio, but this was cured halfway through the project year". (100:31). About the next year's operations the Action Study evaluator said, "Maintenance problems and down time seem to be more of a problem in the second year than in the first." (153:1).

The television ATS-6 experiment had problems with technology and funding as well. Most of the technical problems, however, were more at individual stations and these were soon rectified. The consensus of opinion was that reception was surprisingly good. In fact, related Dr. Koponen, students in the WAMI experiment claimed they had a better view of an operation via satellite over a 1500 land mile distance than they would have had in the amphitheater in Seattle where the operation was taking place. (215). The camera crew could position the camera to

the best advantage and even zoom in for a better look. Funding difficulties had resulted in the dropping of one of the proposed ALED series, Early Childhood Education (ECE); "in mid-June of 1974 OT met with NIE and learned that Basic Oral Language Development (BOLD) and ECE were both to be dropped". (161:V-14). On August 23 the decision was made to continue BOLD, but funding was not actually approved until February of 1975. (161:14). Programming had already begun in October. The uncertainty and the lack of sufficient lead time to script and produce the programs had its effect on the quality of programs produced. (163:II-6).

Measured in terms of achievement of basic goals it can be said that the Action Study was successful in meeting two of the three main aims, and had made considerable inroads with regard to the third. The State had "gained experience" in using the technology; it had "isolated the advantages" as being access to remote areas, reaching many with one program, and interaction; the State had gained some "in-house satellite communication competence." (100:3).

The purpose of the ALED experiment had been stated as determining "if using a satellite is a feasible way to get educational information to and from people in isolated rural areas." (P. 67). It was found to be both possible and practical to reach remote areas via satellite - more practical than by using mail, telephone or terrestrial radio. (P. 42).

The aforementioned methods of evaluation brought to light the existence of problems and weaknesses which were encountered in educational satellite broadcasting. Figure 7 gives a summarized view of these problems together with suggestions for improvement.

Weaknesses were pointed out in order that solutions might be

Figure 7

PROBLEMS AND SUGGESTIONS

Low attendance

- more relevant and interesting programs
- more publicity and promotion
- adhere to regular schedule
- improve technical quality
- relocate speakers or supply additional ones

Occasional poor reception

- continue to refine equipment
- provide better training for operators

Little interaction

- will improve with experience
- needs more direction
- not always necessary

Lack of information about programs

- better training of utilization aids
- use greater variety of promotional methods

Late starts each school year

- provide on-going funding
- sponsor teacher training in summer (workshops?)

Programs lack cultural relevance

- give consumer committees more authority
- give villagers funds for program selection
- provide area networks

Lack of reports from some villages

- discuss job descriptions with utilization aids
- (withhold checks until reports are in)

Some classroom units inappropriate

- consider attention span of young children
- use television rather than radio for elementary
- develop more programs for Jr. and Sr. High age
- use BOLD for pre-school and kindergarten

Interference from non-viewers

- provide baby sitting
- provide activities for non-viewers in nearby room
- provide more secluded area in schools for viewing

suggested, but these weaknesses were considered in relation to overall accomplishments. Tremendous advances that had been achieved: radio and television was available in many small rural villages; villagers had direct contact with each other, with urban areas, with their area headquarters, and at times even with people in other countries or the Lower 48; parents did talk to their children in hospitals or boarding high schools; other villages did expect to be included at a later date; instructional television and radio were broadcast into the classrooms; a consortium, consumer committees, utilization aides, and interaction were included.

Technology

Early satellites were of two kinds - passive, such as Echo which merely echoed or reflected a radio beam back to earth, and active, such as Telstar which had its own receivers and transmitters. Telstar could "amplify, store and rebroadcast messages. A command system received signals from the ground to turn battery power on or off." (29:29). These satellites orbited the earth several times a day, hence needing a series of tracking stations to send or receive messages; they were out of reach of a station at certain points on each orbit. (26:17).

With the advent of synchronous satellites, able to accomplish a twenty-four hour orbit, the satellite could be synchronized with the rotation of the earth. (51:539). The satellite would seem to hover or remain still over the same spot, hence this type of satellite is also called geo-static or geo-stationary. (26:16). Synchronization was accomplished via a circular orbit 22,300 miles above the earth, travel-

ling from west to east, on a plane coinciding with the equator. (38:57).

Because of its great distance from the earth a geo-stationary satellite is "simultaneously visible from a vast portion of the globe." (38:59). Consequently, three geo-static satellites could cover the entire world "except for the areas around the North and South pole where all three satellites would be a trifle below the horizon." (38:60).

Wilbur Schram, Director of the Institute for Joint Communications Research at Stanford University, forecast, in 1968, that synchronous communication satellites would evolve through three stages. The first of these was the point-to-point communication "wherein a satellite of relatively low power transmits a signal from a powerful ground transmitter to an extremely sensitive ground receiver." (168:6). Ground stations of this kind cost in the millions of dollars; the Bartlet earth station near Talkeetna cost over five million. In the second stage satellites of higher power were utilized which were able to serve less sophisticated receiving stations. In this stage, access to the satellites was much easier and they were "used under different conditions to serve local reception points, network outlets,...and schools." (168:6). The third stage was seen to be direct broadcasting, when still more powerful satellites would be able to broadcast television directly to home receivers, which may cost as little as fifty dollars more than the home television set. With such a system one could "conceive of broadcasts from a single outlet that would reach millions of homes over a million square miles or more of the earth's surface." (168:6).

The Alaskan experiments were made possible by the transition from the first to the second of these technological stages of develop-

ment. With the extremely expensive earth stations required by the low powered satellites of stage one, costs would prohibit putting these into small villages. However, with the advent of more powerful satellites, like the ATS series, much less sophisticated ground terminals were needed, and this was the very innovation that made possible the applied technology satellite experiments in Alaska. The third stage of direct-to-home satellite broadcasting has not yet materialized. (87:4).

There were six of these Application Technology Satellites launched by NASA for experimentation, ATS-1, 2, 3, 4, 5, and 6. The ATS-1, weighing about 1500 pounds, was launched in 1966 and has been available for Alaskan use of two or three hours per day since 1970. ATS-2 and ATS-4 launched in 1967 and 1968 respectively, were lost because of launch vehicle failure. (73:11). In November of 1967 the ATS-3 was launched into orbit over the Atlantic Ocean. This satellite was used to interconnect with ATS-1 in the NEA PEASAT programs in order to allow participation of Appalachian teachers with those of the Pacific Basin. Teachers in Appalachia beamed their comments to ATS-3 which beamed them down to a relay station in Denver, from where they were sent to ATS-1 and then on to earth stations in Alaska, New Zealand etc. (183:39). The ATS-5, launched in 1969, has had some stabilizing difficulties, but has been able to function in experiments involving tracking objects on the ground, on the sea and in the air. (73:11). The last of the series, the ATS-6, weighing over 3,000 pounds, was launched in May, 1974, and used in Alaska for the ALED experiment prior to being moved into position to broadcast to India the following year. (73:3). The proposed ATS-G was not launched due to NASA's phase-down of the ATS program.

Communication satellites were merely relay centers in space, or switchboards in the sky; they did not originate messages - they merely amplified them and sent them on. The transmission to a satellite was called an uplink, and from the satellite back down to earth was a downlink.

The ATS-6 had a thirty-foot wide umbrella-like antenna which unfurled in space and had the capacity to point or beam transmissions to earth. This beam concentrated the transmission resulting in a stronger signal. Like the beam of a flashlight, it was not widely diffused, but concentrated on a specific area, usually called its footprint. From the ATS-6 this footprint covered an area on earth about three hundred miles wide and a thousand miles long. (See Map 2, page 70.) The satellite could be directed to re-aim this beam, which had to be done every day after the Rocky Mountain broadcasts to accommodate programming for the Alaskan area. In fact, in order to cover the entire Rocky Mountain area the broadcasting had to be done twice, since this footprint was not wide enough to cover the whole area at once. This was not the same as moving the entire satellite to another part of the world which had to be done for the India experiment, but merely a repointing of the antenna, aiming it in a slightly different direction. (73:4). The ATS-1 and ATS-3 did not have this beaming capacity, consequently they transmitted a weaker signal, but to a larger area. The aim of the ATS-6 was controlled by an experimental computer system in Denver called SAPPAC, Self-Adaptive Precision Pointing Spacecraft Attitude Control. "Another slightly larger funnel-shaped 'earth-viewing horn' transmits programs back to Denver for monitoring". (51:540).

Funding and Costs

The ATS-1 and ATS-6 had different funding structures, but in both cases the satellite time was provided cost-free by NASA. The Action Study of ATS-1 required less funding than the ALED of ATS-6.

In the ATS-1 experiments the Geophysical Institute of the University of Alaska received a contract in the amount of \$421,000 from the "Lister Hill National Center for Biomedical Communications of the National Library of Medicine (one of the U. S. Institutes of Health of the D. H. E. W.) for the establishment and operation of a biomedical communications network in Alaska which was to utilize the VHF transponder of the ATS-1 satellite". (176:4). They were to procure and install 25 small ground stations, train local operators for these, arrange scheduling of the time allotted, and do some evaluation. The receivers were installed in the homes of the village health aides or hospitals. When it was decided to also have an educational experiment on the ATS-1 all that was needed was to put additional monitors in the schools.

The educational part of the project was funded by the U. S. Office of Education under the Elementary and Secondary Education Act (Title III, Sec. 306). In order to receive this grant there had to be handicapped persons among those to be served. (8:35). The total amount received was \$173,310 for the three school year periods, or an average of \$57,769 per year. The grantee was the Alaska State Operated School System, and the money was mainly for salaries for a director and assistant director, half time secretary and half time evaluator. (8:35). Studio space was at first supplied by the Alaska State Operated School System in Juneau and later in the new Tanana Chiefs Office building in Fairbanks.

The programs were presented and funded by various members of the consortium, who in turn often received government aid in producing their programs. The Alaska Federation of Natives and the Alaska Library Association developed an Oral Literature Project (story telling) "which was funded with \$19,000 in MDTA (Manpower Development Training Act) Funds". (8:16). The Alaska Crippled Children's Association received federal aid of \$8,760 for a series of programs for the speech impaired. (8:37). The National Education Association produced their programs with their own funds, amounting to about \$2,000 per year. (237).

In the ATS-6 the funding of the technical aspects came from the U. S. Department of Health Education and Welfare Contract #HEW-OS-73-198 amounting to \$239,360. The grantee for this was the Governor's Office of Telecommunications, who then had the responsibility of procuring, installing and maintaining the earth stations that were suitable to receive television via the ATS-6. Total costs for the entire eight months of operation were \$1,750,574, of which the Alaska Educational Broadcasting Commission supplied \$32,221, the Corporation for Public Broadcasting allocated \$114,249, the National Institute of Education contributed the largest amount, \$1,364,744, in addition to the amount of the HEW contract. (120:3-8).

One major difference in the funding for this demonstration was in the amount paid to develop programs. These colored television programs required studio, props, titles, and action, not just radio as in the case of the ATS-1 project. Programs on the ATS-1 were developed by various organizations at little cost to the project itself, whereas the television programs were developed as a part of the project in the

ATS-6 demonstration. A major effort was to originate, script and produce "culturally relevant" programs. Subcontracts were let to the Northwest Regional Educational Laboratory in the amount of \$214,925 to design and write the programs, and \$708,121 to KUAC station of the University of Alaska to produce them. (120:9).

Another factor which caused ATS-1 expenditures to be lower was that the consortium members either paid their own way to meetings, or their way was paid by the organizations which they represented. The Consumer Committees used in ALED which were composed of representatives from each village for the children's programs, and representatives from each regional corporation for the adult programs, received travel and per diem allowances to attend meetings. The village utilization aides were requested to attend the final evaluation meeting in Anchorage, again at the expense of the project.

One aspect of the funding situation which caused considerable agitation at the local level was the late and indefinite nature of the grants. No one program was able to start at the beginning of the school year and continue until school dismissed in May. Each year programs were of eight rather than nine months duration, and one year the Action Study operated only for six months. This may have been caused in part by program proposals being sent in late. Alaska had to ask for an extension in the time of the deadlines established to receive proposals.

A change in organizational responsibility at the federal level required Alaska to submit more than one proposal for ALED. "Project responsibility changed organizational hands three times at the Federal level to say nothing about people." (102:11-6).

Funds other than for planning grants were not released until five months before broadcasting was to begin for ALED, and final funding was uncertain until February of 1975, four months before the end of the project, and four months after it had begun. A drastic cut in allocations to the Department of HEW caused subsequent reductions in the budgets of the institutes or branches within the department. After the subcontract had been let by the Governor's Office of Telecommunications to the Northwest Regional Education Laboratory for production of three programs, one, Early Childhood Education, was cancelled, and another, BOLD, was cancelled, reinstated, then reduced in scope. This also effected KUAC which had begun program production.

The uncertainty of the funding was responsible in part for the change-over in management of the Action Study. Four different managers have directed the three year program.

Discussed thus far have been the sources and amounts of funding appropriated to each experiment or experiment part. There were also some attempts to arrive at a cost per person per hour of satellite viewing, and to compare the cost of satellite distributed materials with those of mailed tapes or movies.

In calculating cost per person two components needed to be considered - central costs and local costs. Central costs were those of satellite time, the uplink and the program; local costs were the costs of the earth station and other local equipment plus operators. Howard Hupe, Director of Telecommunications Market Development, Office of Telecommunications Policy, Department of Health, Education and Welfare, made such a study "on the basis of the proven costs of the ATS-F (ATS-6)

project and on the manufacturer's estimate of satellite leasing charges." (56:48). Mr. Hupe presented the following Table which illustrated the relationship between the audience size, satellite and uplink cost, programming costs and local costs. (Fig. 8). It was noted that the programming cost per learner hour varied inversely with the number of learners. Likewise, the local cost per learner varied inversely with the number of learners per site. (56:50). Obviously, the more learners to share the costs, the more reasonable the costs would be. This put Alaska at a decided disadvantage when compared with more densely populated regions. On the other hand, Alaska could be viewing at the same time as others in the Lower 48 and thus take advantage of the "numbers reduction".

Another method of arriving at the cost-effectiveness of satellite distributed education was by comparing it with the cost of distributing video tapes. This is what Practical Concepts Incorporated did in their study. "One way to evaluate the use of a satellite for materials distribution is to compare the costs via satellite with the costs via traditional modes such as mailing tapes." (100:V-69). After having done so, they arrived at this conclusion:

Comparing the mailed video tape case with satellite distribution shows a definite advantage for satellite distribution: 2:1 for the worst case comparison and 3:1 advantage for the best case. (100:v-69).

They also stated that "the usefulness of the high power and wide bandwidth of ATS-6 lies in its potential for cost-effective materials distribution". (100:V-1).

Dr. Peter Larsen of the Education Department of the University of Alaska stated that it was not practical to put a dollar value on the benefits of education, and that residents in small villages were entitled

FIGURE 8

COST PER LEARNER HOUR

Central Costs

Number of Learners		Satellite and Uplink Cost Per Learner Per Hour	Programming Cost Per Learner Per Hour
Total	Per Course		
12	1	\$600.00	\$10000.00
120	10	60.00	1000.00
1200	100	6.00	100.00
12000	1000	.60	10.00
120000	10000	.06	1.00
1200000	100000	.006	.10

Local Costs

Number of Learners		Local Cost Per Learner Per Hour
Per Site	Per Course	
4	1	\$5.00
40	10	.50
400	100	.05
4000	1000	.005

Source: Howard Hupe, "An Education Satellite: Costs and Effects on the Educational System".
Educational Technology, O. 74, P. 50.

to educational opportunities similar to those in urban areas. (217). Dr. Wilbur Schramm, Director for the Institute for Joint Communication Research at Stanford University, has said that there is a need to continue to study the application of satellites to "education, science and culture, where the economic opportunity is not always apparent and where special efforts will be required to realize the potential of the new technology." (168:5).

Implications

The events that transpired relative to satellite communications for education in Alaska have been considered in this study. The important implications, effects, and consequences of these events, must also be considered.

The implications have meaning only as they are interpreted in terms of other educational, social and economic changes that were going on concurrently.

The potential impact of educational TV, such as that demonstrated by the ATS-6, cannot be assessed without first looking at other social and economic forces affecting the state's rural residents, particularly Alaska Natives. Major events are happening at an unprecedented rate, multiplying on one another to create change, perhaps in competing directions. Educational TV fits somewhere, primarily because it is inevitable. (161:IV-1).

The impact that satellite education has made as well as potential impact was considered.

Experiments were not of long enough duration to have had a great effect on what pupils actually learned, nevertheless, some effects of existing educational programs have been: enlarging the scope of library services to the villages, providing additional models for English language, causing continued focus on much needed health reform, and promoting a

greater awareness of government operations. The experiments have also focused attention on pressing Alaskan education needs such as local high schools, early childhood education, new school districts, college or vocational training, and bi-lingual education.

Many rural Alaskan youth, 50% in 1972, were sent to urban centers for high school studies. (161:IV-20). This may have been an exciting trip as depicted in the movie, Airways to Learning, (248), but it could also cause serious side effects as Judith Kleinfeld's study, A Long Way from Home, (138), reveals. There were the problems caused by separation and sudden thrust of too young children into an unfamiliar urban situation. There has been a move to establish small high schools at the village level. These, however, with two to four teachers, could not provide the quality or breadth of a larger high school. Curriculum and personnel augmentation via satellite had the potential of providing an answer to Alaska's rural high school problems.

The need for early childhood education in rural Alaska was particularly acute because preschool children there did not usually have access to books, educational toys, or Sesame Street. This need was recognized by the planners of the ALED experiment, and a program for Early Childhood Education was included in the initial proposal. However, because of funding problems this was dropped. It was later found that the program BOLD which was originally planned for five through seven year olds was more appropriate for kindergarten and pre-schoolers. This, together with other suitable canned programs, could be broadcast via satellite into the classrooms and video-taped to be shown to younger children later, or these youngsters could visit the school for certain

programs. In any case, satellite broadcasts for pre-schoolers had the potential of filling this void in their lives.

There was a need to provide job training and college level classes to help Alaskans find work other than in the local village where employment opportunities were very limited. A Native Land Claims College was established by the Alaska Federation of Natives to help meet these needs via correspondence courses. The Land Claims College lasted just two years, but other attempts at providing higher education in the bush have superceded it. The University of Alaska now operates smaller colleges as part of its state-wide operations. Two other groups were striving for greater access to rural students, namely the Tanana Valley Community College and the University of Alaska Extension Service. The facts that education via satellite had proved feasible for elementary students, and that the Alaska Native Magazine program via satellite had provided some vocational information for adults, have pointed the way for increased use of satellite communications to help fill the needs of adults in rural Alaska. Running concurrently with the television experiments in Alaska was a related experiment in Appalachia and the Rocky Mountain Districts.

The prime educational thrust of this experiment is in providing "career education" for junior high school students...However, not all programs are aimed at an adolescent audience. Because career education is a concept as new to teachers as it is to their pupils 16 programs especially for teachers is a part of the design. Eleven programs are directed to the community at large for a general adult audience. (42:15).

This experience could provide the incentive and model for a similar Alaskan venture.

Another educational aspect upon which satellite communications

have had an effect is the decentralization of the State Operated School System. The management of Alaska's educational system had been complicated by a cumbersome structure consisting of 29 independent school districts within the organized boroughs, a scattering of federally operated Bureau of Indian Affairs schools, and the State Operated School System which encompassed all other schools including the on-base schools.

Senate Bill 35 required the establishment of regional attendance areas within the last mentioned group. These would have elected school boards with the same policy-making powers as those within the independent school districts. Each Bureau of Indian Affairs School had the option of becoming a part of the region in which it was located, but several of these chose to remain with the Bureau of Indian Affairs. Previously residents in the "unorganized borough" as the State Operated School System was sometimes called, had only advisory capacity.

In nearly all instances elsewhere in the United States, the people of local school districts are permitted through legislative action to exercise local control by means of an elected school board. Because their school boards are only advisory, the residents of local communities with State Operated Schools or who are under the BIA system have no legal authority to determine the educational program designed for their children. (24:2).

Senate Bill 35 was passed in 1975 to take effect in 1976, thus part of the adult programming in the ALED project was directed at helping the area residents become acquainted with their new roles of being responsible for the education within their areas - possibly their new roles as school board members with more than advisory functions. Satellite communications also provided a means for dissemination of board policies and decisions when such needed to reach all schools quickly.

Satellite communications had implications for the bi-lingual

situation in rural Alaska. This problem was further complicated by the fact that "linguists have identified twenty distinct languages spoken among native people of Alaska." (161:IV-11). These, according to Dr. Krauss of the Alaska Native Language Center of the University of Alaska, could be grouped into the Eskimo-Aleut, the Athabaskan-Eyak, and the Tlingit-Haida-Tsimshin. There was the continual conflict with trying to keep these native languages viable while still learning the English of the school and commerce. English was not only the language of the dominant culture, it was also the vehicle in which peoples of various native groups could understand each other, for the native languages did not have sufficient common elements. It has been previously mentioned that satellite communications provided another English-speaking model. Also the program BOLD was to teach basic English conversation to those for whom English was a second language. On the other hand, a satellite with its several voice channels, afforded an opportunity for transmissions in various languages. This feature would prove more useful when satellite broadcasts were transmitted into the homes, or where there were more than one receiver in the village. As it was in the experiment, the English had to be turned off to hear another language, and many people could understand only English. At times the utilization aide switched back and forth from one language to another, but this move, appealing as it was intended, prevented either group from really following the program. Federal regulations have recently been implemented to require the teaching of native languages in the schools where a minimum number of bi-lingual students attended. Satellite communications could be a real asset here, in that a teacher could reach several schools at one time.

The bi-lingual situation was but one aspect of the entire cross-cultural nature of education in the village.

The socio-cultural background of the teacher is almost always very different from that of the students. Schools are physically, socially, architecturally, and culturally removed from the rest of the village in most cases. (161:II-17).

Putting a satellite radio or television in the school when the rest of the village had none could widen the gap between the two; or it could be the means of getting more villagers into the schools and thereby foster a closer relationship.

Suggestions for the resolution of the cultural problems depended on varying points of view. Some said that native Alaskans should become entirely absorbed into the white culture. Others believed that they should strive to maintain and reestablish their former way of life. Still others felt that Alaskan Natives should accept the best of the modernization of the white culture, but still keep their language intact, and their customs and traditions alive. Obviously there was conflict in such divergent basic philosophies. Satellite communications were seen as creating an appetite for the way of life of the dominant culture; on the other hand it was a vehicle for the promotion of local culture. Perhaps satellite communications can bring the issues into sharper focus: the aspects could be debated, and because of the interaction feature many individuals could participate.

Since employment opportunities in the village were so limited many of the inhabitants there lived in poverty and dependence upon welfare assistance. Two factors have had considerable impact on rural Alaskan economic life, namely, the oil pipeline and the Alaska Native Claims Act.

The building of the oil pipeline, stretching almost eight hundred miles from Prudhoe Bay to Valdez, has provided employment at high wages for many Alaska natives both urban and rural. "Alaska Natives earn an estimated \$13.5 million per quarter in wages while working on the pipeline; Alaska Natives own subsurface royalties to 40 million acres of Alaska land." (161:II-14). Many earned over one thousand dollars per week. (210). For rural Alaska such high earnings would mean that they could afford home television sets; they would be able to invest in a cable distribution system for satellite broadcasts; they would be able to buy some of the products seen on television. The Alaska government will also receive vast earnings from the pipeline which would put it in a position to be able to finance satellite communications, perhaps put its own satellite in orbit.

The Native Claims Settlement Act was the result of

a class action suit brought by Alaska Indians and Eskimos against the United States Government for illegal expropriation of land. Under the Act, 60,000 Alaska Natives receive from the United States Government \$462.5 million spread over 15 - 20 years, and all subsurface, and one half the surface rights to 40 million acres. In addition 500 million will be derived by regional and village corporations from mineral royalties. (161:II-15).

To control this income, 12 regional corporations and 210 village corporations were set up. The corporations have invested in buildings and hotels, thus they were in themselves potential employers. Regional corporations would need reliable communications, which suggested a regional communications network. The added employment opportunities also indicated a need for training and vocational information which could be accomplished with satellite aid.

Chapter Summary

This Chapter has presented the findings regarding the reasons Alaska was included in the experiments, the chronology of main events, formal and informal programs, evaluation, technology, funding, and implications. The evaluations and implications were those found in the literature, or obtained from interviews, correspondence or audio-visual materials. In the following Chapter the researcher tests the hypotheses, presents conclusions and makes recommendations.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The National Aeronautics and Space Administration had developed a series of applied technology satellites for experimental purposes in the 1960's and 1970's. Because of their high intensity these satellites were capable of transmitting to small relatively inexpensive earth stations. Alaska, with its sparse population, vast distances, and poor terrestrial communications, was chosen as an ideal place to carry out satellite experiments. Consequently, earth stations were erected and the state was permitted some broadcasting time on the ATS-1 and ATS-6 satellites for biomedical and educational purposes from 1970 through 1975.

At the conclusion of the experiments the state was faced with decisions about advancing to commercial satellite use, obtaining a state owned satellite, or discontinuing the services. This was considered by the researcher to be an appropos time to make a concerted study of the experiments to gain information that would be valuable to people responsible for making decisions relative to future satellite use. Therefore, materials about the experimental period of educational uses of satellites were gathered by reviewing correspondence, writing to agencies, searching the library, studying government documents, and interviewing at least 45 people.

It was found that there were two experiments or demonstrations during this period. There were the "Action Study Satellite Project", often referred to as just the Action Study, and the "Alaska Education Satellite Communication Demonstration" commonly called the ESCD or ALED.

The Action Study broadcast radio programs two or three hours per day during the school years of 1971-72, 1972-73, and 1973-74, into selected small villages. A consortium of interested organizations or agencies was formed to guide the experiment. The consortium members provided the programs. One unique feature of this experiment was interaction, the opportunity for viewers to respond or ask questions during or after the broadcast. In 1974 the Action Study was phased into the ALED.

ALED began broadcasting colored television to 19 small earth station receivers via ATS-6 in October of 1974. The ATS-1 was used for the audio portion and interaction. This experiment was an attempt to produce programs as well as transmit them. One person from each participating village was chosen to help guide the programming. Utilization aides were hired to operate equipment and be the liaisons in the villages. The demonstration ended when the ATS-6 was moved to another part of the world in May of 1975.

Evaluations were accomplished by interviews, attendance logs, interaction reports, meetings, and hired evaluators. Some of the weaknesses were found to be occasional poor reception, small audiences at times, hesitancy in using interaction, indefinite funding, some poor or inappropriate programs. Accomplishments were that broadcasts both by means of radio and television had been delivered to many rural Alaskan

communities, unique features such as inexpensive earth stations, interaction, consumer committees, and utilization aides, were put into use.

Education via satellite was found to have implications for several aspects of rural life in Alaska. Educationally, besides producing and broadcasting programs to supplement classroom instruction, there were an increase in the scope of library services, study of much needed health reform, aid for newly established rural high-schools, focus on early childhood, vocational and bi-lingual education, and reorganization of the State Operated School System. Sociologically, satellite broadcasting helped to identify the commonalities and differences between the dominant white culture and that of the Native groups - Indians, Eskimo and Aleut. Economically, the new wealth created by the Trans-Alaska Pipeline and the Alaska Native Claims Settlement Act, had made it possible for Alaska villagers to buy television sets, programs and the goods seen on television; it had provided more funds for the Alaska government to underwrite satellite broadcasting on its own; it had shown the need for adult education to fill the needs of the new job market.

Indeed, this innovation proved to be an effective technological means to provide educational, sociological and economic information to the bush communities which previously had little such access.

Conclusions

In the introduction to this dissertation seven hypotheses were posed. The conclusions regarding these hypotheses are considered with regard to the data presented.

1. Education in Alaska was furthered by communication satellites.

The veracity of this statement can be seen by reviewing specific instances wherein education was furthered by satellite use, and considering other educational uses that have been suggested.

Teacher seminars allowed teachers to attend university classes while still in the village and to confer with other teachers in Alaska, Appalachia, Hawaii and New Zealand. (P.62). This could have been accomplished only by means of satellites.

Classroom units of various subjects were broadcast for elementary students. (P.63,72). Certain children's programs were available via movies or video tape, but the vast distances, inclement weather, and lack of reliable terrestrial transportation made access to these extremely difficult.

Only via satellite was live, real-time, broadcasting possible. Thus Alaskans were able for the first time to see important news and sports events while they were in progress. (P.64).

Teaching and demonstrations were interchanged between medical students and faculty of the WAMI project, involving persons in Washington, Alaska, Montana and Idaho. (P.74). Alaskan students could watch demonstrations currently in progress at the University of Washington Hospital.

Indirectly, satellite communications provided another English Language model, and showed aspects of metropolitan life that helped to prepare villagers to adjust to a different life style when they had to leave the village for a while. (P.49). Satellites were used not only to show aspects of Western civilization to the Natives, but also to enhance and promulgate their own culture. (P.62).

Satellite capacity was just beginning to be used in Alaska. Its potential for furthering other educational areas such as Early Childhood, High School, Bi-lingual, Vocational, Data Retrieval and Computer Assisted Instruction was not tapped during these experiments, but their possibilities were explored.

From these instances it can be seen that education in Alaska can indeed be furthered by communications satellites. Not only was this an effective way of furthering it but in some instances this was the only method whereby certain educational services could be rendered.

2. Technological refinements were made to enable all areas of the state to receive the broadcasts.

It has been mentioned that three satellites could cover the entire earth, therefore one could cover the entire state of Alaska. (P.88). This was not accomplished in these experiments, however. In order to receive the broadcasts earth stations were required, and these were installed only in selected villages for experimental purposes. Over a period of time such receivers could be placed in each village, but this has not yet been accomplished. The size of the footprint of the ATS-6 was another limiting factor, being three hundred miles wide and five hundred long. Two beams were used, thus making it three hundred by a thousand miles but even this did not cover the entire state. (See Map 2). The site selections for ALED was limited to sites within the footprint of the ATS-6, which had to include Fairbanks and Juneau since these had uplink capacity. The ATS-1 covered a wider area (see Map 1), but was not powerful enough to effectively broadcast television to all areas.

It can be concluded, then that satellites can broadcast to all areas of the state, but it has not yet been done because sufficient earth stations have not been erected, and the ATS series of satellites were not quite powerful enough to do so.

3. The benefits were worth the expenditures.

Some people maintained that satellites should be used regardless of cost because their educational value cannot be measured in dollars and cents. Since satellites were the only means to get information into some small villages, they should be used without consideration of cost.

This could be a debatable opinion, were it not for the fact that satellite broadcasting was also found to be cost-effective. Based on studies made by Howard Hupe in a cost-analysis of satellite uses for educational purposes in general (P.34), and on studies made by Practical Concepts Incorporated on the cost-effectiveness based specifically on the Alaskan situation (P.97), it was found that distributing education via satellite had financial advantages as well as educational ones.

4. Viewer input was advantageous in program selection.

Viewer input from teachers was not obtained prior to selection and broadcasting of classroom programs in either experiment. This lack of input was considered a drawback inasmuch as needs of the classrooms could have been more specifically met, and the cooperation and attitude of teachers were crucial for classroom participation.

Prior to the second year of broadcasting for the Action Study a summer workshop was held for teachers. Following the ALED experiment

the following recommendation was made, "Design of educational programming should also involve close and consistent coordination with the rural educators who will be receiving the programs". (120:51). In both experiments, then, it was felt that input from teachers was important.

In the ALED demonstration there was an elaborate system instituted to secure viewer input in the form of consumer committees. There were two separate committees, one with members selected from each participating village which oversaw the classrooms units (the representatives were not teachers), and another, consisting of a representative from each native corporation, helped in the selection of the adult programs. The following recommendation was made, "The GOT strongly recommends the continued utilization of the consumer committee concept to directly involve villagers in program design and planning." (120:50).

Because villagers would be more apt to participate if they received programs they wanted; because villagers would feel that the television was "theirs" and not something imposed on them if they had a say in the programming; because the planners of both experiments deemed this aspect important enough to incorporate it into their experiments; and because the evaluations from both experiments recommended its continuance, it can be said that viewer input was advantageous in program selection.

5. Viewer response via satellite was a desirable feature.

Viewer response, also called interaction, was a salient part of some programs such as parent-to-child-away-from-home, classroom interchanges between Alaska and California, and teleconferencing. It would

be difficult to conceive of these types of programs as merely one-way broadcasts. Interaction was also valued in discussions of political issues, and for asking questions in the "What do you want to know?" type of programs. However, there were some programs that did not lend themselves to audience response such as musical productions, and story telling. (See Fig. 5). Attempting to secure interaction in such programs was a waste of valuable satellite time. Viewer response may be valued by program writers, but some viewers did not appreciate their responses being heard "all over Alaska," and were therefore reluctant to participate. (P.77). In some cases the interaction feature was used as a roll-call to see which stations were listening. Other methods of roll-call, if this were desired, could be used so that the entire audience would not be kept waiting while each station answered in turn. Therefore, it can be concluded that viewer response (interaction) was necessary in some cases, desirable in others, and unnecessary in still others; desirability depended on the type and purpose of the program.

6. Government agencies and non-government agencies cooperated effectively in planning and producing programs

In the Action Study the State Operated School System was the grantee of funds received from the Department of Health Education and Welfare; the Geophysical Institute of the University of Alaska had the contract to maintain the equipment from the National Institute of Health, and the programs were produced by organizations such as the National Education Association, Alaska Federation of Natives, the Alaska Library Association, the Alaska Crippled Children's Association

and the Education Department of the University of Alaska, - obviously a conglomeration of government and non-government agencies. Three school years of programming of two to three hours per day resulted, showing that these agencies could cooperate in managing and presenting programs. Since there were so many and such varied groups involved, it did take considerable effort on the part of the manager to coordinate and inform everyone of activities. The entire management structure was somewhat cumbersome, but effective programming was produced.

In ALED the organizational structure was somewhat streamlined in that the Governor's Office of Telecommunications (GOT) was responsible for maintaining the equipment, producing programs and scheduling. There was cooperation between the GOT, broadcast station KUAC and the Northwest Regional Education Laboratory in program production. However, the relationship was different in that the non-government agencies were hired by, and under contract to, the GOT. The consumer committees and utilization aides were non-government groups, but the consumer committees depended upon GOT funds to attend meetings, and the utilization aides were hired by GOT.

In both experiments there was a good working relationship between NASA which supplied the satellite time and the state agencies which utilized that time. There was cooperation and continued correspondence between state and national government agencies especially since the national agencies were the main funding sources for the state operated experiments. Also GOT had to work closely with other state agencies like the Department of Education and the State Operated School System.

Internationally, 91 nations have worked together in Intelsat (International Telecommunications Satellite Consortium) providing for the development, launching and maintenance of satellites. (P.35).

It can be concluded, then, that not only did government and non-government agencies cooperate effectively in planning and producing programs, but also that various government agencies and even foreign countries cooperated effectively with each other.

7. A State with multi-ethnic background found suitable commonalities for a statewide education via satellite system.

All areas of the state based their school curriculum on State guidelines. Even if this had not been the case, there would have been more common factors than different ones in the school curricula which could form the basis for education via satellite. Furthermore, adults basically have many problems, hopes, desires and needs in common which would be suitable elements upon which to base an adult educational communications program for the state. English was the common language in almost all areas.

On the other hand, there were differences in cultural background and languages. There were four main ethnic groups - Whites, Eskimo, Aleut and Indian - and there were 20 different languages or dialects identified. It was found that these aspects were best handled on a regional basis. Programs such as the Nulato Stick Dances or Whaling at Point Barrow appealed mostly to the people in the area in which they were produced. Likewise, teaching of native languages was best directed at the area in which the specific language was in use. Because

of the availability of various voice channels via satellite it was possible to use native languages at the same time as English, particularly if a separate monitor or room was provided to receive the other language. (P.26). This type of broadcasting did not need to be limited to an area network, but could be accomplished statewide.

Therefore, it can be seen that a state with multi-ethnic background can find suitable commonalities for a statewide education via satellite system, but that in order to accommodate and sustain the multi-ethnic feature of the Alaskan population regional networks would at times be preferable to using the statewide capacity.

Recommendations

Many suggestions were made in Chapter IV under the heading "Evaluation". These were suggestions directed at overcoming specific problems which were revealed as a result of the evaluations. Suggestions were also included in the "Implications" section in order to include potential impact as well as actual impact. The following recommendations are more all-encompassing in nature; they are directed to the individuals who must make decisions relative to the future of satellite telecommunications for educational uses in Alaska. (P.3,4).

The researcher recommends that no further experiments or demonstrations be initiated, but that the state should move as quickly as possible into the operation of a regular satellite education system. The experiments that were carried on during 1970-75 have shown that satellites provided an effective means of furthering education in Alaska. What was needed now was the continuation and expansion of the services. Furthermore,

the indefinite and temporary nature of experiments have caused rural Alaskans not to take the program as seriously as they might if it were to be an on-going project. The fact that the ATS-6 was being moved to India has caused some rural Alaskans to be somewhat resentful of the "give and then take-away" situation. As the Practical Concepts Incorporated's report said, "Building expectations without providing the means to carry on into an operational mode after the experimental tools and funds are removed is counterproductive and even destructive". (163:3).

No "further experimenting" should not preclude further study, however. The following areas are suggested for further research:

1. Possible effects of television on rural Alaskans.
2. The optimum number of hours of television per day.
3. The application of satellites to help solve the high school problems of rural Alaska.
4. The feasibility of training Alaskan natives to produce local or culturally relevant programs.
5. Use of satellites to provide pre-school education or even parent-child co-schooling.
6. Use of satellites to expand the "foxfire" concept, a learning process which utilizes the child's own culture and community to enrich his curriculum, and enhance his self-identity.

The Governor's Office of Telecommunications (GOT) should continue to be the authority for installing, maintaining, and expanding the technical aspects of the system. The operational part of this could be contracted out to commercial companies, but the GOT should be the respon-

sible party. Also, scheduling and selection of programs should be their prerogative. They could use various means of securing input as to the effectiveness of their choices, such as consumer committees, questionnaires, interviews, or conferences with the Office of Education, but the overall responsibility for scheduling should rest with the GOT. One agency in charge of operations and scheduling saves time and confusion.

Although the scheduling and selection of the programs should be the prerogative of the GOT, program production should not be attempted by them. Their work in producing programs for ALED proved to be expensive and time-consuming. They should buy or lease ready-made materials. This would not preclude the production by others of programs with local flavor, in fact, this should be encouraged. The GOT should have the authority to select programs from any source - local or outside, large company or individual, culturally relevant or not.

As far as possible programs should be taped rather than broadcast live. (P.33). This would make editing possible and negate the effects of no-shows which plagued the Action Study. This was not recommended for all programs because one of the advantages of satellites was access to real-time viewing. However, when real-time was not of an essence, the programs should be pre-taped and previewed before transmission.

It is recommended that GOT seek funds for the further expansion of the system to include more villages by erecting additional small earth stations. Only about one-tenth of the Alaskan villages were included in the ATS-1 or ATS-6 experiments; others were anticipating being included too.

Native or Village Corporations should be encouraged to establish

a local cable system or mini-television to get broadcasting into individual homes as well as merely into schools, community centers or the health aide's home. This should not be state funded, but locally funded, thus ensuring that villagers have a real interest in "their" television. Although money received from the Native Claims Settlement Act could not be used to supplant social, medical or other aid to which natives have been entitled, it could be used for new projects. (11). Proceeds from their investments, or some of the capital itself, should be used in part to improve village life. Investing in a cable system or mini-television, including an adequate source of power to run them, would be one worthwhile improvement for which these funds could be used.

Utilization aides should be employees of the village rather than of the state thus making them responsible to an agency which can give closer supervision, and giving the village greater voice in what transpires. Since there has been some problem regarding the turning in of required reports from the utilization aides this closer supervision (or even withholding of payment until reports are received) was recommended.

The investigator recommends that interaction be used only with selected programs and not be considered an integral part of each broadcast. Programs such as discussion of political issues would lend themselves to interaction, but others, such as musical programs or classroom units, should not require it. Interaction within the classroom should be encouraged, but not interaction via satellite. Roll-call as a form of interaction should be discouraged. This may be suitable for medical programs, but there should be some other method for stations to indicate their presence if this was requested.

Another recommendation concerned the use of video-taping equipment. This should be available at each earth station so that programs which were delivered at an inconvenient time could be taped for replay. Programs or information could then even be broadcast during the night when channels were more likely to be available and replayed at the viewers' discretion, even used more than once if desired. (P.33).

It is further suggested that some form of regional network be adopted for certain programs, especially those directed to specific, regionally defined, areas. Some type of local network should be used, perhaps paralleling the newly formed regional corporations or school districts, to handle material of a local or specific cultural nature.

Finally the recommendation to continue broadcasting via satellite for education in Alaska is reiterated. These experiments demonstrated that satellite communications have very distinct advantages; state agencies have gained "hands on" experience; money was now available; more Alaskans were anxious to use the media; the commercial system was expanding; therefore it behooves Alaska to take advantage of these accomplishments and forge ahead to an even greater expansion of satellite communications for educational uses in Alaska.

APPENDIX I

ABBREVIATIONS AND ACRONYMS

AEA or NEA/Alaska, Alaska Education Association
AEBC, Alaska Educational Broadcasting Commission
AETC, Alaska Educational Telecommunications Consortium
AFN, Alaska Federation of Natives
AK, Alaska
AKLA, Alaska Library Association
ALED, Alaska ATS-6 Education Demonstration
ANM, Alaska Native Magazine
ASL, Alaska State Library
ASOSS, Alaska State Operated School System
ATS, Applied Technology Satellite
A-V, Audio-visual
BIA, Bureau of Indian Affairs
BOLD, Basic Oral Language Development
CNER, Center for Northern Educational Research, University of Alaska
COMSAT, Communications Satellite Corporation
CTS, Communications Technology Satellite
DOE, Alaska State Department of Education
ECE, Early Childhood Education
ESCD, Educational Satellite Communications Demonstration
ETV, Educational Television
FCC, Federal Communications Commission
GI, Geophysical Institute, University of Alaska
GOT or OT, Governor's Office of Telecommunications
HEW, United States Department of Health, Educations and Welfare

HF, High Frequency

INTELSAT, International Telecommunications Satellite Consortium

ISEGR, Institute for Social, Economic and Governmental Research,
University of Alaska

ITV, Instructional Television

KFAR, Radio-television station at Fairbanks

KUAC, Radio-television station at the University of Alaska

MDTA, Manpower Development Training Act

MINI-TV, low power broadcast television

NASA, National Aeronautics and Space Administration

NEA, National Education Association

NEA/ALASKA, or AEA, Alaska Education Association

NEATS, News Every Alaskan Teacher Seeks

NEASAT, National Education Association Satellite (Alaska-Hawaii Association
Program)

NIE, National Institute of Education

NPR, National Public Radio

NWREL, Northwest Regional Educational Laboratory

OT or GOT, Governor's Office of Telecommunications

PBS, Public Broadcasting Service

PCI, Practical Concepts Incorporated

TCC, Tanana Chief's Conference

TV, television

UA or U of A, University of Alaska

UN, United Nations

UNESCO, United Nations Educational, Social, and Cultural Organization

VHF, Very High Frequency

WAMI, Washington-Alaska-Montana-Idaho Medical School

APPENDIX II

APPENDIX II

INTERVIEWS

<u>Person and Affiliation</u>	<u>Subject of Interview</u>	<u>Place</u>	<u>Date</u>
Armstead, Earlean, Video Center	Program Production	Fairbanks	Oct. 1 1977
Behlke, Charles, Eng. Dept. U of A	Use for Higher Ed.	Fairbanks	Oct. 1977
Brown, Fred - Legislator	Use of small earth stations	Fairbanks	Nov. 1976
Cooksey, Robert - NEA/Alaska	NEA's Involvement	Anchorage	March 1976*
Cridge, Edward, Media Cent. U of A	Prog. Production	Fairbanks	Oct. 1977
Eininger, Marianne - NEA/Alaska	Fairbank's Involvement	Fairbanks	Oct. 1976*
Emmert, Reginald, Media Services	Broadcasting materials	Fairbanks	Oct. 1977
Driscoll, Kay - ATS-1 Project Manager	Current ATS-1 Uses	Fairbanks	Aug. 1977
Gray, Don Ian - Fairbanks Teacher	Participation in Program	Fairbanks	Oct. 1976*
Gullickson, Donald, BIA	Sats. in BIA Schools	Fairbanks	Oct. 1977
Harrington, Jan., Kotzebue Librarian	Library Usage	Fairbanks	Oct. 1977
Hartman, Paul - KUAC	Program Broadcasting	Fairbanks	Oct. 1976
Hayes, James - Earth Sta. Engineer	Bartlett Earth Station	Anchorage	March 1977
Hecht, Kathryn - CNER, U of A	CNER Satellite Files	Fairbanks	Aug. 1977
Heine, Darwin - State School Board	Future Satellite Use	Fairbanks	Oct. 1976

APPENDIX II - Continued

<u>Person and Affiliation</u>	<u>Subject of Interview</u>	<u>Place</u>	<u>Date</u>
Hiebert, Augie - Ak. Sat. Com. Task Force	Project History	Anchorage	March 1977
Inouye, Ronald, CNER, U of A	Continued Usage	Fairbanks	Oct. 1977
Kleinfeld, Judith, ISEGR, U of A	High School Situation	Fairbanks	Oct. 1977
Koponen, Niilo - Consultant	ATS-1 Program, ATS-6 Proposal	Fairbanks	Aug. 1977
Lannigan, David, Fairbanks School District	Use of Materials from Fairbanks Schools	Fairbanks	Oct. 1977
Larson, Peter - Dept. of Ed., U of A	Educational Implications	Fairbanks	Oct. 1976*
Lewis, William A. - Ak. Methodist U.	Organization of Materials	Anchorage	Jan. 1976*
Liebowitch, Margaret - State Library	Library Programs	Juneau (phone)	Sept. 1977
Matthews, Mary - State Librarian	Library Programs	Fairbanks	Aug. 1977
Merritt, Robert, Eng. Dept. U of A	Technology	Fairbanks	Oct. 1977
McPherson, Karen - Native Assoc.	Taped Native Stories	Fairbanks	Aug. 1977
McPherson, Roger - Native Assoc.	ATS-1 Programs	Fairbanks	Aug. 1977
Orvik, James - CNER, U of A	ATS-6 Project	Fairbanks	Nov. 1976
Parker, Walter B. - ATS-1	Action Study Reports	Anchorage (ph)	Sept. 1977
Pittman, T. Sue, ATS-1 Prog. Dir.	ATS-1 and ATS-6	Fairbanks	Oct. 1977
Polley, Ernie - Ak State Dept. of Ed.	Future Plans, Questionnaire	Juneau (ph)	Jan. 1977

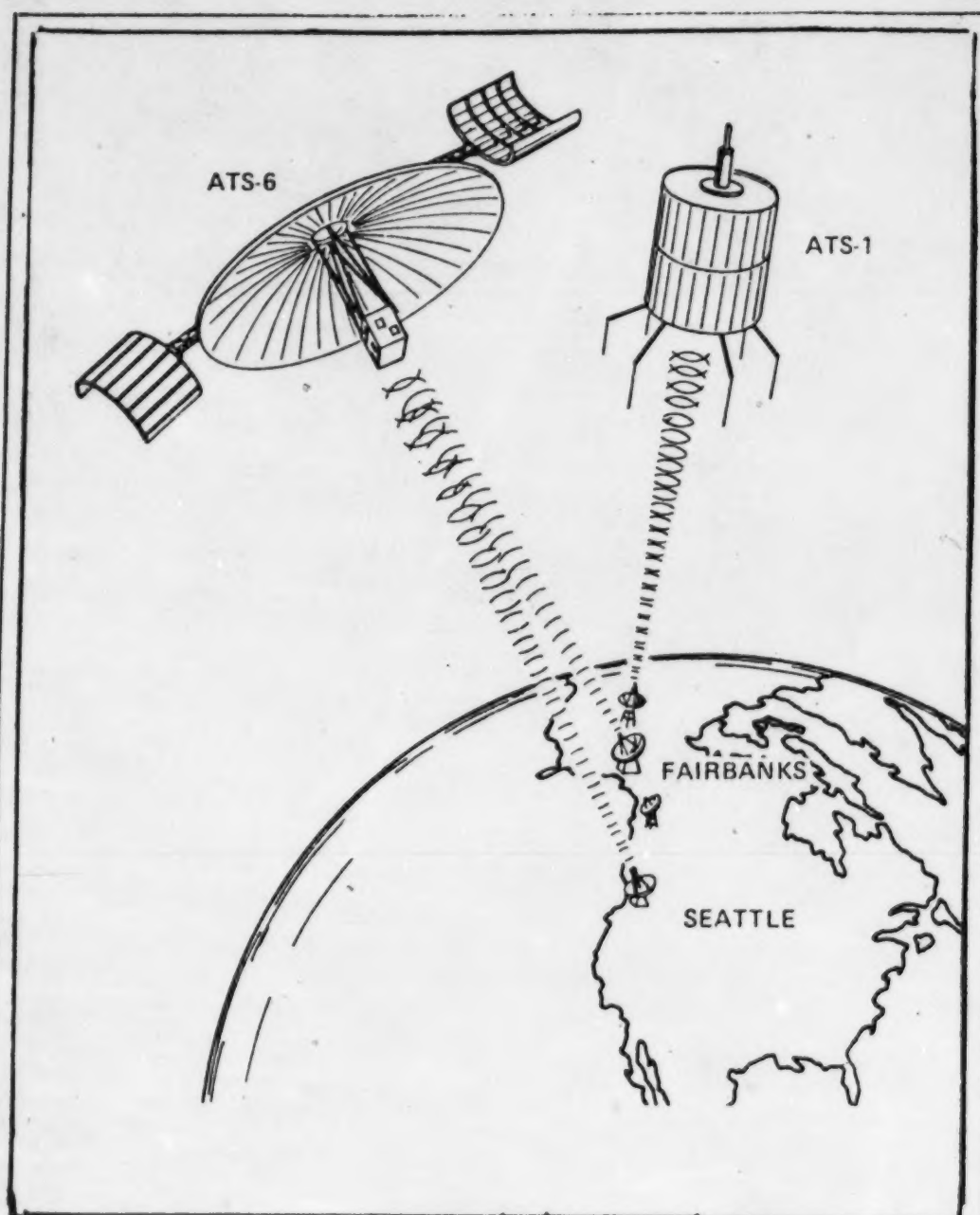
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APPENDIX II - Continued

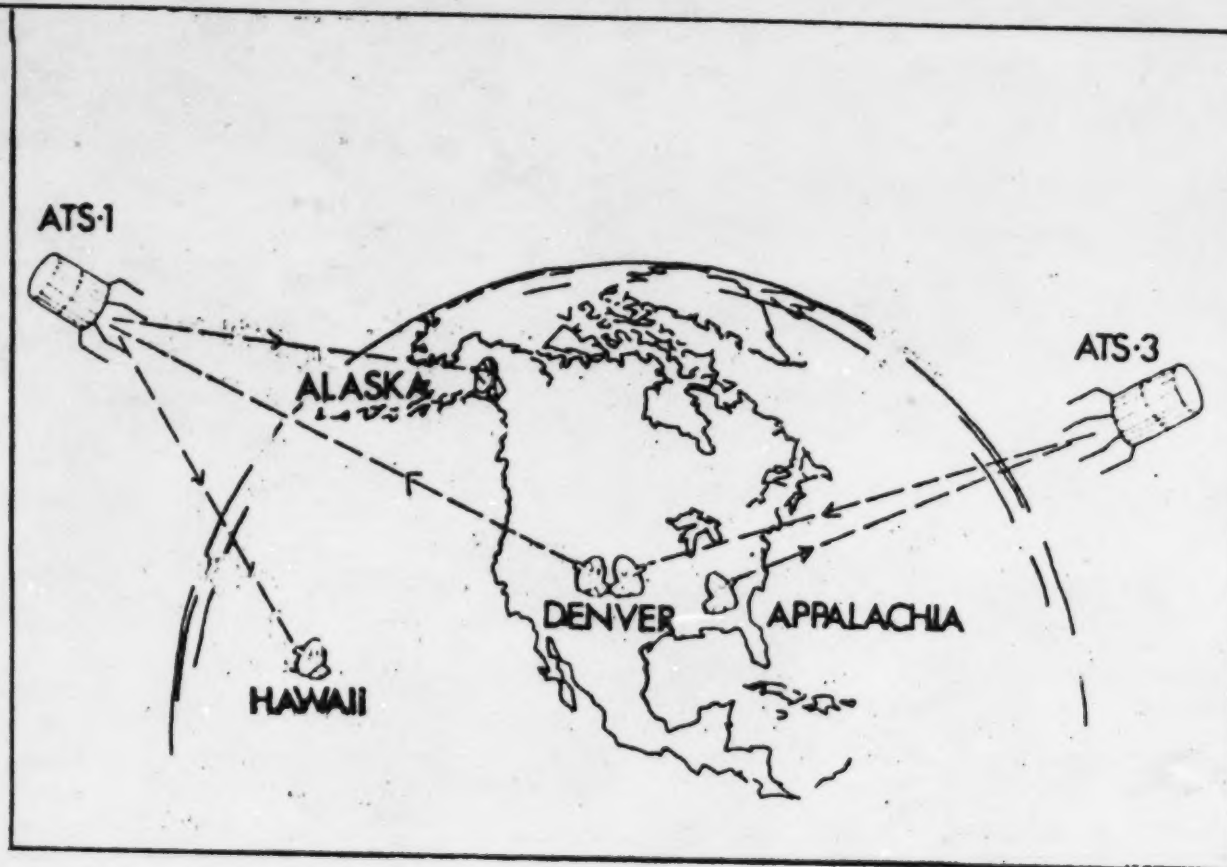
<u>Person and Affiliation</u>	<u>Subject of Interview</u>	<u>Place</u>	<u>Date</u>
Rasmussen, Ronald, GI, U of A	Small Earth Stations	Fairbanks	Oct. 1977
Shaginaw, George, GOT	Technology	Fairbanks	Oct. 1977
Sherry, Paul - Tanana Chiefs	ATS-1 Programs	Fairbanks	Aug. 1977
Smith, Benjamin, Adult Learning Center	Use for Adults	Fairbanks	Oct. 1977
Smith, James, Ext. Service, U of A	Future Uses	Fairbanks	Oct. 1977
Stanley, Glenn, GI, U of A	Technology	Anchorage	Oct. 1977
Taylor, Rex - Office of Telecomm.	Securing State Materials	Anchorage	March 1977*
Tisdell, Myron - KUAC	Location of KUAC Progs.	Fairbanks (ph)	Sept. 1977
Upham, Donald, KUAC Manager	KUAC broadcasting	Fairbanks	Oct. 1977
Parr, Karen, BOLD scriptwriter	Land Claims College	Fairbanks	Oct. 1977
Van Houte, Robert - NEA/Alaska	Satellite Capabilities	Anchorage	Jan. 1976*
Van Zant, Frank - Military	History of Telecomm.	Anchorage	March 1977
Wedel, Millie - Anchorage Teacher	Current Status	Anchorage	March 1977*
Wilke, Jennifer - Ak. State Dept. of Ed.	State's Participation	Anchorage	March 1977
Windsor, Jane - Ext. Service U of A	Adult uses	Fairbanks	Oct. 1977

*More than one contact.

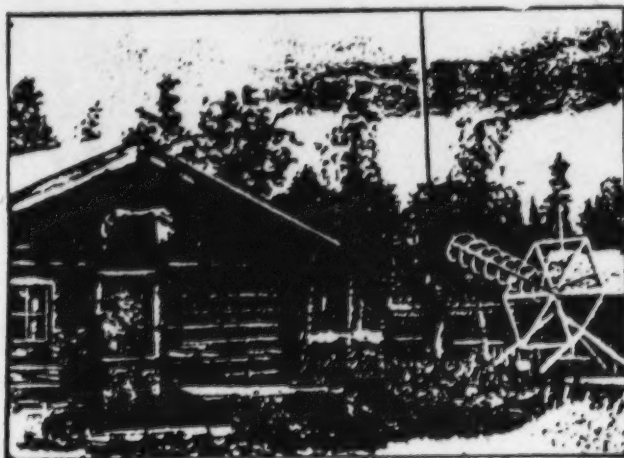
APPENDIX III



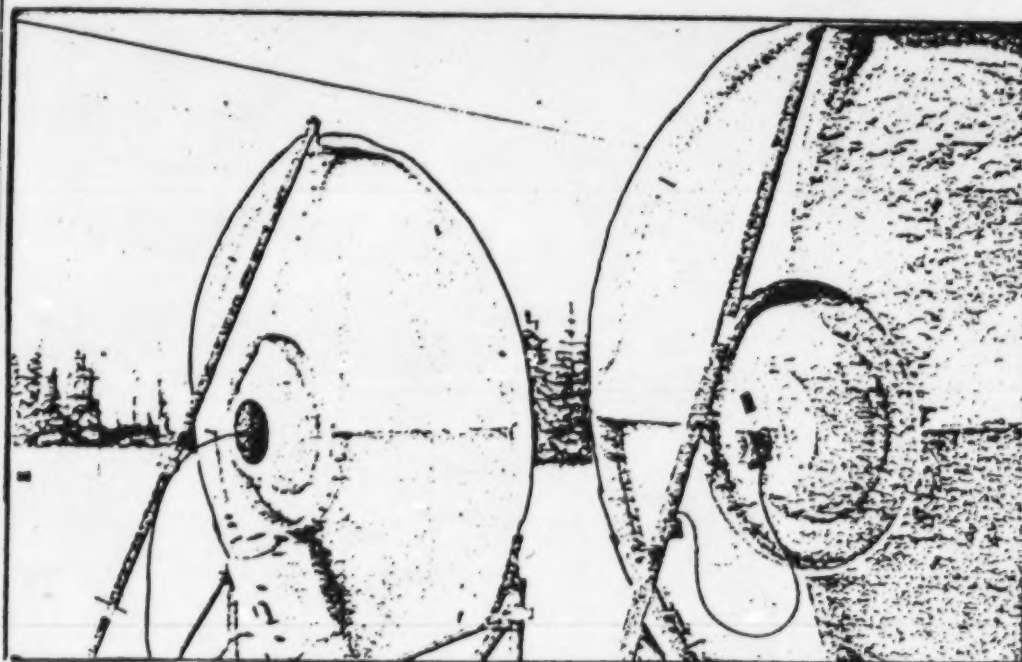
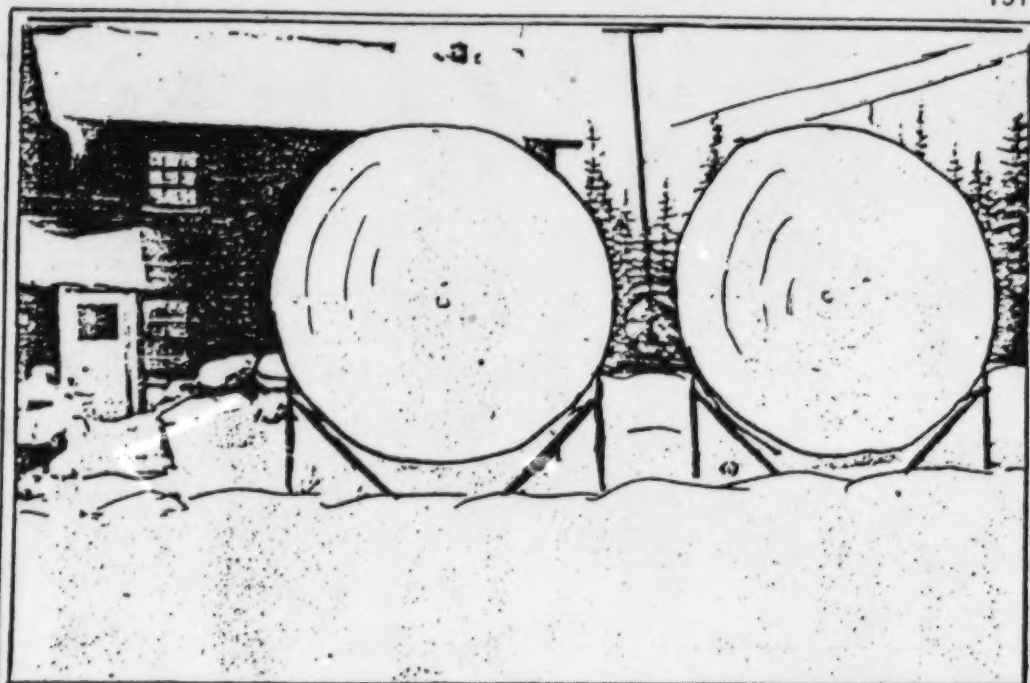
ATS-1 and ATS-6. (Both are positioned above the equator.) from
NASA Facts



Uplinks and Downlinks Required to Transmit from Appalachia to Alaska or Hawaii from Teacher-to-Teacher Communications (NEA's Pan Pacific Experiment) by John Sullivan.



ATS-1 EARTHSTATIONS at Chalkyitsik and Tanana. from Radio Communications in Alaska and Other Remote Areas with Special Reference to Satellite Communications by Glenn Stanley.



ATS-6 EARTHSTATION at Fort Yukon (one dish is for uplink, other for downlink) from: Telemedicine as a Tool for Providing High Quality Health Care in Rural Alaska by Bond

BIBLIOGRAPHY

Government Documents

1. Alaska. Alaska Native Language Center. Alaska Statutes 14,40.117, 1972.
2. Alaska. Education in the Unorganized Borough. Alaska Statutes 14.08, 1975.
3. Alaska Governor's Office of Telecommunications. Contract # 1067 with Northwest Regional Education Laboratory, December 18, 1973.
4. Alaska Governor's Office of Telecommunications. Contract # 1068 with KUAC, March 18, 1974.
5. Alaska Governor's Office of Telecommunications. Contract # 1665 with Ann Alexi, Utilization Aide, 1974.
6. Alaska State. House Bill 297, "An Act Creating the Public Communications Commission". Sixth Legislature, First Session, 1971.
7. Alaska State. House Committee Substitute for Senate Bill 149, A Bill to Erect Satellite Ground Station, April, 1975.
8. Alaska State Operated School System. Continuation Application for Action Study Satellite Projects, Grant # ORG-X-71-0045(290), July 1, 1973.
9. United Nations. Resolution 2916 (XXVII), "Principles Governing Use of Space...".
10. United Nations. Resolution 1721 DXVI, "International Cooperation on the Peaceful Uses of Space".
11. United States. Alaska Native Settlement Act. 85 Stat. 688, December, 1971.
12. United States. Communications Satellite Act of 1962. 76 Stat. 419.
13. United States Congress. House, Committee on Science and Astronautics. The NASA Authorization Act. Hearings Before the Committee on Science and Astronautics H. R. 4567. 93rd Congress, First Session, 1974.
14. United States Congress House. Committee on Science and Technology. NASA Authorization Act. Hearings Before the Committee on Science and Technology. H. R. 2931. 94th Congress, First Session, 1975.

15. United States Department of Health, Education and Welfare.
Contract # HEW-OS-72-149 with the Alaska Educational Broadcasting Commission, 1972.
16. United States Department of Health Education and Welfare, National Institute of Education Contract # C-74-0148 with Practical Concepts Incorporated, 1974.
17. United States Department of Health, Education and Welfare, National Institute of Education Contract # 400-76-4005 with the Alaska Office of Telecommunications, 1976.
18. United States. Elementary and Secondary Education Act. 81 Stat. 783, 1968.
19. United States. NASA Authorization Act. 76 Stat. 382, 1963; 77 Stat. 141, 1964; 78 Stat. 310, 1965; 79 Stat. 192, 1966; 80 Stat. 336, 1967.

Books

20. Asinov, Isaac. Satellites in outer Space. New York, New York: Random House, 1960.
21. Borg, Walter and Call, Meredith. Educational Research, an Introduction. New York, New York: David MacKay Co., 1971.
22. Cole, Stephen. The Sociological Method. Chicago, Illinois: Rand McNally College Pub. Co., 1972.
23. Darnell, Frank, (editor). Education in the North, Fairbanks, Alaska: University of Alaska, 1972.
24. Darnell, Frank; Hecht, Kathryn; and Orvik, James. Prehigher Education in the Unorganized Borough: Analysis and Recommendations. Fairbanks, Alaska: CNER, University of Alaska, 1974.
25. Galloway, Jonathan. The Politics and Technology of Satellite Communications. Lexington, Mass: Heath & Co., 1972.
26. Grayson, Laurence; Norwood, Frank; and Wigren, Harold. Man-made Moons, Satellite Communications for Schools. Washington D. C.: National Education Association, 1972.
27. Greve, Tim; Lied, Fin; and Tanberg, Erik. The Impact of Space Science Upon Mankind. New York: Plenum Press, 1975.
28. Kinsley, Michael. Outer Space and Inner Sanctums. New York: John Wiley & Sons, 1976.
29. Kohn, Berniece. Communications Satellites Message Centers in Space. New York: Four Winds Press, 1975.

30. Laskin, Paul. Communication by Satellite. New York: 20th Century Fund Inc., 1969.
31. Lukashok, Alvin. Communication Satellites, How They Work. New York: G. P. Putnam's Sons, 1967.
32. Musolf, Lloyd, (editor). Communication Satellites in Political Orbit. San Francisco, California: Chandler Publishing Co., 1968.
33. Ordway, Frederick. Dividends from Space. New York: Crowell Co., 1972.
34. Orvik, James and Barnhardt, Ray. Cultural Influences in Alaska Native Education. Fairbanks, Alaska: Center for Northern Educational Research, University of Alaska, 1974.
35. Ray, Charles. A Program of Education for Alaska Natives. Fairbanks, Alaska: University of Alaska, 1959.
36. Rummel, Francis. An Introduction to Research Procedures in Education. 2nd Edition. New York, New York: Harper and Row, 1964.
37. Signitzer, Benno. Regulations of Direct Broadcasting from Satellites, The United Nations Involvement. New York: Praeger Publishers, 1976.
38. Van Braun, Wernher. Space Frontier. Greenwich, Connecticut: Fawcett Publications Inc., 1969.

Magazine and Newspaper Articles

39. Abraham, A. S. "Satellite Aims for Remote Villages." Times Education Supplement. May 30, 1975, 3131-14.
40. Bramble, William and Ausness, Claudine. "Appalachia's on the Beam". American Education, May 1976.
41. Bronson, V. "International Classroom Likely, But Not Yet." A. V. Instructor. June, 1963, 8:394-5.
42. Burke, J. R. and Norwood, Frank. "Satellite Development and the ATS-6". A. V. Instructor. May 1975, 20:12.
43. Byers, B. H. "Classroom Interaction, Satellite-interposed PEASAT Project." A. V. Instructor. December 1973, 18:20.
43. Coyne, W. "Education's Rising Star." American Education. November 1972, 8:16-24.
44. Derman, S. "Synchronous Earth Satellite Problems." Physics Teacher. October 1972, 10:400-1.
46. Dyer, Mary. "Education's Own Satellite." The Journal of Aerospace Education, May 1974.

47. Dwyer, L. "Oscar Satellite Educational Series," Science Teacher. September 1975, 42:28.
48. Edelson, Burton. "Satellite Communications - A Benefit Realized." Science. October 1975.
49. Feiner, Albert. "Health Care and Education: on the Threshold of Space." Science. December 27, 1974.
50. Furer, Sheila. "Satellite Training Institute," The Sourdough. Fall 1974, page 4.
51. Hendrickson, Jr., W. R. "Teacher in the Sky." Phi Delta Kappan. April 1975, 56:539-41.
52. Grayson, Laurence P. " " Journal of Educational Technology Systems. Fall 1974, 3(2).
53. Hickel, J. Steven. "Cross Cultural Education in Alaska: Not How but Why." Phi Delta Kappan. January 1977. 58:403.
54. Hoagland, Richard C. "The Talking Star of Arthur Clarke." The American Way (American Airways Inflight Magazine). January 1975.
55. Hupe, H. H. "Coming Broadcast Satellites: Where They Should and Should Not Be Used in Delivering Education Services." Educational Technology. December 1974, 14:40-3.
56. Hupe, H. H. "Educational Satellite: Costs and Effects on Educational System." Educational Technology. October 1974, 14:48-52.
57. Miller, L. W. "Global Village: Today's Involvement in Global Educational Tomorrow." A. V. Instructor. June 1974, 19:53.
58. "Delivering Education by Satellite." American Education. January-February 1976.
59. Orvik, James. "The Future of Bilingual Education in Alaska: An Analysis of the Issues." The People Paper. Center for Northern Educational Research. March 1975.
60. Polcyn, Kenneth. "Current Communication; Satellite Educational Experimentation: an Overview." A. V. Instructor. February 1973, 18:32-5.
61. Polcyn, Kenneth. "Future United States Educational Broadcast Satellite Experiments": The State of Alaska Experiment." Educational Technology. January 1974, 14:27-31.
62. Polcyn, Kenneth. "Joint United States-India Educational Broadcast Satellite Experiment." Educational Technology. June 1973, 12:14-17.

63. Polcyn, Kenneth. "Proposed Brazilian Education Satellite Experiment." Educational Technology. July, 1972, 12:20-5.
64. Polcyn, Kenneth and Papay, James. "The Educational Potential of Broadcast Satellite Technology." Lycoming College Magazine. June, 1972.
65. Raymond, H. A. "Educational Staellites: Capabilities and Limitations." A. V. Instructor. January, 1972, 17:14-15.
66. Rubin, Philip. "Satellites: A Status Report." Public Telecommunications Review. December 1974.
67. Schwartz, M. Roy. "In the Northwest, Its WAMI." American Education. May, 1976, page 16.
68. Simmons, Dianne. "Satellite Communications: What Use Should Be Made of the New Capabilities?" Fairbanks Daily Newsminer. March 11, 1976.
69. Van Braun, Wernher. "Lighting Up the Earth's Dark Corners with TV from the Sky." Popular Science. March, 1975.
70. Wedemeyer, C. A. "Communications Satellite: Vehicle for a New Independence in International Adult Education." Convergence. January, 1972, 1:14-15.
71. _____. "Alaska Students Use ATS-1 Too." Alaska Teacher. Winter 1973-74, 22:24.
72. _____. "Alaskan Seminar by Satellite." Today's Education. May, 1973, 62:40-1.
73. _____. "Applications Technology Satellite-6 (ATS-6)." NASA Facts, United States Government Printing Office, Washington D. C. January 1975.
74. _____. "ATS and the Future." Journal of Aerospace Education. October, 1975, 2:6:4-5.
75. _____. "The ATS-6 American Case Studies." Educational Broadcasting International. December, 1975, 8:4:149-154.
76. _____. "Communication Satellites, Education and Social Services- A Calendar of Current and Future Events." Educational Broadcasting International. December, 1975, 8:4: 146-148.
77. _____. "Delivering Education by Satellite." American Education. January, 1975. 11:39-40.
78. _____. "Direct Broadcast Satellites and Cultural Integrity." Society. September-October, 1975, 12:6:47-56.

79. _____. "Education of Alaska Natives." Intellect. November 1973, 102:78.
80. _____. "The Educational Satellite A System Model." Journal of Educational Technology Systems. Spring 1975, 3:4:249-266.
81. _____. "GED by TV." Alaska Magazine. October, 1977, A17.
82. _____. "In the Sky." CERES. October 5, 1975, 8:5:25-28.
83. _____. "Learning Through Satellite Broadcasting." Literacy Discussion. February, 1975, 6:3:105-20.
84. _____. "Legislation Drastically Changes Delivery of Education in Alaska." Alaska Teacher Newsletter. October, 1975, 2:1.
85. _____. "Line Satellite Communications: An Exciting Teaching Aid." Journal of Aerospace Education. March, 1976, 3:3:4-5.
86. _____. "A New Star Rises in an Overcrowded Sky." Business Week. May 31, 1976.
87. _____. "No Longer Pie in the Sky." TV Guide. April 6, 1974.
88. _____. "Satellite." The Sourdough. May, 1975, page 14.
89. _____. "Satellite Communications: Villages to Have Contract with Educational Television." Tundra Times. (Fairbanks) July 14, 1971.
90. _____. "Satellite Helps Kids in Isolated Regions." Information. (Quarterly Newsletter of the NIA, Washington D.C.) Undated.
91. _____. "Satellite Negotiations Stalled Over Earth Station Ownership." Fairbanks Daily Newsminer. April 24, 1975, page 2.
92. _____. "Worldwide Planning Undertaken by Teachers Via Satellite Hook-up." Alaska Teacher Newsletter. October, 1974, page 4.

Related Studies

93. Alloway, Howard and Witten, Donald. "Powerful TV Satellite Prepared for Launch." National Aeronautics and Space Administration, Washington D.C., May 1974.
94. Berkey, Frank and Northrip, Charles. A Pilot Study of Education Broadcasting in Alaska via Communication Satellite. Governor's Office of Telecommunications, State of Alaska, November 1968.
95. Bond, Donald. Telecommunications as a Tool for Providing High Quality Health Care in Rural Alaska. Radio Corporation of America, Anchorage, Alaska, March 15, 1975.
96. Bramble, William. Cost Estimate Model for Alternative Formats and Delivery Modes. Technical Report #10. August 1976.

97. Brewer, Ron R. A Feasibility Study of Communication Satellite for Education in the United States. PhD Research, University of Tennessee, 1969.
98. Brong, Gerald H. Evaluation Report: Tri-Dimensional Training Program for Community Librarians. Alaska State Library, Juneau, 1975.
99. Buck, Charles and Northrip, Charles. Report on Alaska Use of ATS-1 Satellite Through September 30, 1972. Governor's Office of Telecommunications, State of Alaska, May 1, 1973.
100. Buck, Charles and Northrip Charles. Report on Alaska use of ATS-1 Satellite October 1, 1972 Through June 30, 1973. Governor's Office of Telecommunications, State of Alaska, May 1, 1974.
101. Bystrom, J. W. The Application of Satellites to International Interactive Service Support Communication. Proceedings of the Royal Society of London, A:493-510, 1975.
102. Cassirer, Henry and Wigren, Harold. Alaska: Implications of Satellite Communications for Education. United Nations Educational, Social and Cultural Organization/National Education Association, Paris, France, 1970.
103. Chapman, J. H. and Currie, J. W. Radio Noise from Aurora. Geophysical Institute, University of Alaska, Fairbanks, Alaska, 1953.
104. Chays, Abram. Satellite Broadcasting. Oxford University Press, New York, 1973.
105. Commission on Cross-Cultural Education. Time for Change in the Education of Alaska Natives. Center for Northern Education Research, University of Alaska, 1971.
106. Cowlan, Bert and Foote, Dennis. A Case Study of the ATS-6 Health, Education and Telecommunications Projects. Agency for International Development, Washington, D. C., August 1975.
107. Diambra, Henry. VIDAC; A New Technology for Increasing the Effectiveness of Television Distribution Networks: Report on a Feasibility Study of a Central Library "Integrated Media" Satellite Delivery System. September 1975.
108. Dieuzeide, Henri. The Possible Uses of Communications Satellites in Education. United Nations Educational, Social and Cultural Organization, Paris, France, 1965.
109. Dizard, Wilson. Communications Satellites: Looking Down the Road. Paper presented at the Annual Meeting of the Association for Education in Journalism, San Diego, California, August 18-21, 1974.

110. DuMolin, James and Morgan, Robert. An Instructional Satellite System for the United States--(Premilinary Consideration). Washington University, St. Louis, Missouri, July, 1971.
111. Federation of Rocky Mountain States, Inc. Satellite Technical Demonstration: Final Report. Denver, Colorado, October, 1975.
112. Filep, Robert T. Communication Satellites and Social Services Focus on Users and Evaluations. An Annotated Bibliography. University of Southern California, Los Angeles, California, November, 1975.
113. Foote, Dennis, Parker, Edwin and Hudson, Heather. Telemedicine in Alaska: The ATS-6 Satellite Biomedical Demonstration. Stanford University, 1976.
114. Gaven, Patricia and Williams, R. David. ATS-F and Man: A Course of Study: An Experiment in Satellite Application to Statewide Instructional Methodology. Alaska State Library Association, Juneau, November 1972.
115. Goad, Nick S. An Evaluation of Current Planning for Alaska Satellite Communication. Masters Research, University of Alaska, 1970.
116. Governor's Office of Telecommunications, "Alaska ATS-F, Health Education Telecommunications Experiment" State of Alaska, March, 1974. (Mimeographed.)
117. Governor's Office of Telecommunications; Alaska ATS-6 Health Education Telecommunications Experiment. State of Alaska, undated.
118. Governor's Office of Telecommunications. ATS-6 Health Education Telecommunication Experiment: Alaska Education Experiment Vol. I Final Report. State of Alaska, Juneau, Alaska, 1975.
119. Governor's Office of Telecommunications. ATS-6 Health Education Telecommunication Experiment: Alaska Education Experiment Vol. II Final Report Appendices A-E. State of Alaska, Juneau, Alaska, 1975.
120. Governor's Office of Telecommunications. ATS-6 Health Education Telecommunication Experiment: Alaska Education Experiment Vol. III Final Report Appendices F-J. State of Alaska, Juneau, Alaska, 1975.
121. Governor's Office of Telecommunications. ATS-6 Health Education Telecommunication Experiment: Alaska Education Experiment Vol. IV Final Report Summary. State of Alaska, Juneau, Alaska, 1975.
122. Governor's Office of Telecommunications. Educational Telecommunication Alternative for Alaska. State of Alaska, Juneau, Alaska, 1976.

123. Governor's Office of Telecommunications. Planning to Meet Alaska's Educational Needs Through Telecommunications. State of Alaska Juneau, Alaska, January 1977.
124. Governor's Office of Telecommunications. A Proposal to Develop a Plan for Alaska's Unique and Innovative Education Demonstration Employing ATS-F. State of Alaska, Juneau, Alaska 1972.
125. Governor's Office of Telecommunications. Report on Alaska Use of the ATS-1 Satellite Through September 30, 1972. State of Alaska, Juneau, Alaska, 1972.
126. Hammet and Edison. Education Communications in Alaska. San Francisco, California. July, 1971
127. Hanessian, John and Margolin, Joseph. Broadcast Satellites their Potential Use for Education Purposes, and Their Relationship to International Understanding and Cooperation. George Washington University, Washington, D.C. July 1969.
128. Hilliard, Robert L. "How're You Going to Keep Them Down on the Farm After They've Seen TV?" Speech presented to American Management Association Annual Conference on Education and Training, New York, August 1970.
129. Hinchman, Walter and Dunn, D. A. The Future of Satellite Communication Resource Management and the Needs of Nations. Twentieth Century Fund, New York, 1970.
130. Hudson, Heather. College Curriculum Sharing Via CTS. American Institute of Aeronautics and Astronautics, New York, July 1975.
131. Hudson, Heather and Parker, Edwin. "Medical Communication in Alaska by Satellite" quoted as Appendix C in Bond, Donald, Telemedicine as a Tool for Providing High Quality Health Care in Rural Alaska.
132. Impact Information Center. Pipeline Impact on Education. Report 33, Fairbanks North Star Borough, Fairbanks, Alaska, January 19, 1976.
133. Information Office of the Communications, Satellite Corporation, Pocket Guide to the Global Satellite System. Washington D.C. 1974.
134. International Telecommunications Union. Tenth Report by the International Telecommunications Union on Telecommunications and the Peaceful Uses of Outer Space. United Nations Educational, Social and Cultural Organization, Paris, France, 1971.
135. Jamison, Dean, and Ball, John. Using Satellites to Improve Efficiency in Delivery of Educational Services. Stanford University, December, 1972.

136. Jamison, Dean and Klees, Steven. The Cost of Instructional Radio and Television for Developing Countries. Stanford University, March, 1973.
137. Jones, Martin and Jones, Richard. Lessons Learned in Past Social Service Programs Evaluations, and Their Applicability to the NIE ESCD Demonstration. Impact Assessment Institute, Bethesda, Maryland. May 1974.
138. Kleinfeld, Judith. A Long Way from Home. Center for Northern Educational Research, University of Alaska, Fairbanks, Alaska.
139. Kreimer, Osvaldo. Health Care and Satellite Radio Communications in Village Alaska. Final Report of the ATS-1 Biomedical Satellite: Experiment Evaluation. Stanford University, June 1974.
140. Lind, Marshall. Annual Report Department of Education. Office of Public Information and Publications, State of Alaska, 1972.
141. Ling, Suilin. A Study of The Potential Telecommunications Needs of the State of Alaska. Teleconsult, Inc. Washington, D.C. May, 1972.
142. Maddox, Brenda. Beyond Babel; New Directions in Communications. Andre Deutsch Limited, Publisher, London, England, 1972.
143. Merritt, Robert P. "Telecommunications Requirements in the State of Alaska". University of Alaska, September 1974, (mimeographed.)
144. Morgan, Robert P. "Application of Communication Satellite to Educational Development; An Overview of the Washington University Program." Washington University, St. Louis, Missouri. July, 1971.
145. Morgan, Robert P. and Singh, Jai. A Guide to Literature on Application of Communication Satellite to Educational Development. Stanford University, May, 1972.
146. National Aeronautics and Space Administration. NASA: National Aeronautics and Space Administration. United States Government Printing Office, Washington, D.C. 1971.
147. National Education Association, A Declaration of Interdependence: Education for a Global Community. Washington, D.C. 1976.
148. Northrip, Charles. Report on ATS-1 Use by KUAC. Governor's Office of Telecommunications, State of Alaska, September 14, 1972.
149. Ohlman, Herbert. Communications Media and Education Technology: An Overview and Assessment with Reference to Communication Satellite. Washington University, St. Louis, Missouri, May, 1971.

150. Orvik, J. "Education Satellite Communication Demonstration Study." Center for Northern Educational Research, University of Alaska.
151. Parker, Walter. Interim Evaluation Report Phase I Action Study of Educational Uses of Satellite Telecommunications in Remote Alaskan Villages. Anchorage, January 12, 1972.
152. Parker, Water B. Village Satellite I: Evaluation of Some Educational Uses of The ATS-1 in Alaska. Anchorage, 1972.
153. Parker, Walter B. Village Satellite II: Evaluation of Some Educational Uses of the ATS-1 in Alaska. Anchorage, 1973.
154. Parker, Walter B. Village Satellite III; Evaluation of Some Educational Uses of the ATS-1 in Alaska. Anchorage, 1974.
155. Pittman, Theda Sue and Orvik, James M. ATS-6 and State Telecommunications Policy for Rural Alaska: An Analysis of Recommendations. Center for Northern Educational Research, Univesity of Alaska, Fairbanks, Alaska, 1976.
156. Polcyn, Kenneth. An Educator's Guide to Communication Satellite Technology. Agency for International Development, Washington D.C., September 1973.
157. Polley, Ernie. Telecommunications and the Future of Alaskan Education. Department of Education, State of Alaska, undated.
158. Polley, Ernest and Freer Marshall. Educational Telecommunications Alternatives for Alaska. Department of Education, State of Alaska, 1976.
159. Porter, Steven. "The NIE's Educational Satellite Communication Demonstration: Lessons Learned and their Federal Policy Implications" Paper presented at the Telecommunication Policy Research Conference in Airlie, Virginia, April 1976.
160. Practical Concepts, Inc. Intensive Evaluation of Satellite TV impact on Four Alaska Villages. Supplement to Basic ESCD Evaluation Design. Washington D.C., May 1974.
161. Practical Concepts, Inc. Implications of the Alaska Satellite Communications Demonstration for Telecommunications and Education Policy Makers. Vol. I Analysis of the Demonstration Practical Concepts Inc., Washington D.C., 1975.
162. Practical Concepts Inc. Implications of the Alaska Satellite Communications Demonstration for Telecommunications and Education Policy Makers. Vol. II Supporting Materials Practical Concepts Inc., Washington D.C., 1975.

163. Practical Concepts Inc. Implications of The Alaska Satellite Communications Demonstration for Telecommunications and Education Policy Makers. Vol. III Executive Summary Practical Concepts Inc., Washington D.C. 1975.
164. Radio Corporation of America. "Educational Aides-RCA Alascom" undated.
165. Radio Corporation of America. RCA Alascom: Answering Alaska's Communications Needs. Van Cleve Printing, Anchorage, undated.
166. Radio Corporation of America. RCA Alascom Documentary Film. Anchorage Public Affairs Office, RCA Alascom.
167. Rothenburg, Donna. Early Childhood Education: Status, Trends and Issues Related to Electronic Delivery. Washington University, St. Louis, Missouri, May 1973.
168. Schramm, Wilbur L. Communication Satellites for Education, Science and Culture. United Nations Educational, Social and Cultural Organization, Paris, France, 1968.
169. Schramm, Wilbur L. Mass Media and National Development. United Nations Educational, Social and Cultural Organization, Paris, France, 1964.
170. Schramm, W.; Coombs, P. H.; Kahnert, F; and Lyle, J. The New Media: Memo to Educational Planners. United Nations Educational, Social and Cultural Organization, Paris, France, 1967.
171. Sher and Tompkins. "Economy, Efficiency and Equality: The Myths of Rural School and District Consolidation". National Institute of Education, Washington D.C..
172. Smith, Delbert. International Telecommunication Control: International Law and the ordering of Satellite and other Forms of International Broadcasting. Humanities Press, New York, 1969.
173. Stagl, Thomas and Others. Computer-Aided Communications Satellite System Analysis and Optimization. Washington University, St. Louis, Missouri, October 1973.
174. Stagl, Thomas, and Singh, Jai. Computer Programs for Plotting Spot-Beam Coverages from an Earth-Synchronous Satellite and Earth-Station Antenna Elevation. Angle Contours, Memorandum Number 72/4. Washington University, St. Louis, Missouri, October 1972.
175. Stanley, Glenn M. Final Report - Feasibility Study of A Satellite Communication System for North Slope Borough. Geophysical Institute, Univesity of Alaska, May 1974.

176. Stanley, Glenn M. Radio Communications in Alaska and Other Remote Areas with Special Reference to Satellite Communications. Geophysical Institute, University of Alaska, undated.
177. Sullivan, John et, al. Using Satellite Technology to Increase Professional Communications Among Teachers. National Education Association, Washington D.C., 1975.
178. Temp, George. "Interim Educational Accomplishment Audit of the Action Study of Educational Uses of Satellite Telecommunication in Remote Alaskan Villages." March 1972.
179. Temp, George. "Final Audit Report of Action Study of Educational Uses of Satellite Telecommunication in Remote Alaskan Villages." August 1972.
180. United Nations Educational, Social and Cultural Organization. Draft Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, The Spread of Education and Greater Cultural Exchange. United Nations, Paris, France, July 1972.
181. Walkmeyer, John. Market Scenarios and Alternative Administrative Frameworks for United States Educational Satellite Systems. Memorandum No. CG-75/2. Washington University, St. Louis, Missouri, 1973.
182. Wigren, Harold. Teachers in the Sky: The Outlook for Educational Uses of Satellites. National Education Association, Washington D.C., 1975.
183. Wigren, Harold et. al. Teacher to Teacher Communications, Report of the NEA's Pan Pacific Satellite Experiment-1976. National Education Association, Washington D.C., 1976.
184. _____. The Case Against Satellites. The Network Project. Notebook Number Seven. Columbia University, New York, 1974.
185. _____. The Design and Early Years of the First Education Communication Satellite Experiment Report 1. Peacesat (Pan Pacific Education and Communication Experiment by Satellite) Project Early Experiment. University of Hawaii, October 1975.
186. _____. Early Uses of InternNational Two Way Communication By Satellite for Social Development Report 2. Peacesat (Pan Pacific Education and Communication Experiment by Satellite) Project Social Application. University of Hawaii, October 1975.
187. _____. Using Satellite Communication Network to Improve Social Conditions Report 3. Peacesat (Pan Pacific Education and Communication Experiment by Satellite) Project Network. University of Hawaii, November, 1975.

Interviews and Correspondence

188. Adams, Joy. Public Affairs Department, RCA Alascom, Anchorage, Alaska. Interview, September, 1977.
189. Armstead, Earlean. Video Center, Fairbanks, Alaska. Interview, October, 1977.
190. Bartlett, U. S. Senator Robert. Letter to NASA. March 15, 1968.
191. Behlke, Charles. Professor of Engineering, University of Alaska. Fairbanks, Alaska. Talk to Telecommunication Consortium, October, 1977.
192. Brown, Fred. Legislator, State of Alaska. Interview. Fairbanks, Alaska. November, 1976.
193. Butler, Assistant Secretary, Department of Health, Education and Welfare. Memo to HEW Secretary. February 9, 1971.
194. Campbell, Bert. RCA Alascom, Anchorage. Interview, September, 1977.
195. Cooksey, Robert. Deputy Executive Secretary, National Education Association, Alaska. Anchorage, Alaska, March, 1976.
196. Cooksey, Robert. Deputy Executive Secretary, National Education Association, Alaska. Letter to Satellite users November 1, 1976.
197. Cooksey, Robert. Deputy Executive Secretary, National Education Association, Alaska. Letter to Mary Ann Einingers and others. May, 8, 1974.
198. Cridge, Ed. Media Services, University of Alaska. Interview. October 1977.
199. Driscoll, Kay. Current ATS-1 Manager. Interview. August, 1977.
200. Einingers, Marianne. Regional Director, National Education Association, Alaska. Interview. October 1976.
201. Emmert, Reg. Media Services, University of Alaska. Interview. October 1977.
202. Gravel, Senator Mike. Press release. May 1969.
203. Gravel, Senator Mike. Press release. May 1, 1970.
204. Gray, Don Ian. Teacher. Fairbanks North Star Borough. "Mr. Satellite." Interviews, September 1976; November 1976; March 1977; October 1977.

205. Gullickson, Don. Bureau Indian Affairs. Interview. October 1977.
206. Harrington, Jan. Kotzebue Area Librarian. Interview. October 1977.
207. Hartman, Paul. Satellite Project Manager. Interview. October 1976.
208. Hayes, James (engineer for earth stations). Anchorage, Interview.
March 1977.
209. Hecht, Kathryn. Center for Northern Educational Research, University
of Alaska. Interview. September 1976.
210. Heine, Darwin, member Alaska State School Board, Fairbanks.
Interview. November 1976.
211. Hiebert, Augie. "Northern Television, Past and Future" Lecture.
National Education Association, Alaska Convention. March 1977.
Interview. Anchorage. March 1977.
212. Hilscher, Hilary, Governor's Office of Telecommunications. Memo.
State of Alaska, Juneau. January 25, 1975.
213. Inouye, Ronald. Center for Northern Educational Research, University
of Alaska. Interview. October 1977.
214. Kleinfeld, Judith. Institute for Social and Economic Research.
Fairbanks. Interview. October 1977.
215. Koponen, Nillo. Educational Consultant. Fairbanks. Interview.
August 1977.
216. Lannigan, Dave. Fairbanks, North Star Borough School District.
Fairbanks. Interview. October 1977.
217. Larson, Peter. Department of Education, University of Alaska.
Fairbanks. Interview. October 1976.
218. Lewis, William A. Alaska Methodist University, Anchorage.
Interview. January 1976.
219. Liebowitch, Margaret. Alaska State Library, Juneau. Interview.
September 1977.
220. Matthews, Mary. State Librarian, Fairbanks. Interview. August
1977.
221. McPherson, Karen. Alaska Federation of Natives. Interview.
October 1977.
222. McPherson, Roger. Native Association. Interview. August, 1977.
October 1977.

223. Merritt, Robert. Department of Electrical Engineering, University of Alaska, Fairbanks. Interview. October 1977.
224. Orvik, James. Center for Northern Educational Research, University of Alaska. Fairbanks. Interview. October 1976.
225. Parker, Walter B. Anchorage. Interview. September 1977.
226. Pitman, Theda Sue. ATS-1 Program Scheduler. Interview. October 1977.
227. Polley, Ernie. Interview. January, 1977.
228. Rasmussen, Ron. Geophysical Institute, University of Alaska. Interview. October 1977.
229. Shaginaw, George. Deputy Director, Office of Telecommunications. Interview. October 1977.
230. Sherry, Paul. Tanana Chiefs. Fairbanks. Interview. August 1977.
231. Smith, Benjamin. Adult Learning Centers. Fairbanks. Interview. October 1977.
232. Smith, James. Cooperative Extension Service, University of Alaska. Interview. October 1977.
233. Stanley, Glenn. formerly of the Geophysical Institute, University of Alaska, Fairbanks. Interview. October 1977.
234. Taylor, Rex. Interviews Anchorage, March 1977. Fairbanks, October 1977.
235. Tisdell, Myron. KUAC Programmer. Fairbanks. Interview. September, 1977.
236. Upham, Donald. General Manager. KUAC, University of Alaska. Interview. November 1976, October 1977.
237. Van Houte, Robert. Executive Secretary National Education Association, Alaska. Interviews. Fairbanks. Anchorage.
238. Van Houte, Robert. Address to National Education Association/ Alaska Convention March 1977.
239. Van Zant, Frank. "History of Telecommunications" (in Alaska). Lecture re Non-educational Uses) Teachers Convention. Anchorage. Interview. March 1977.
240. Wedel, Millie. Anchorage Teacher. Interview. March 1977.
241. Wigren, Harold E. Letter to Dr. Ray Barnhardt. Coordinator Alaska Rural Teacher Training Corps, College of Education. University of Alaska. May 14, 1973.

- 242. Wilke, Jennifer. Department of Education. Interviews. Anchorage, March 1977. Fairbanks. October 1977.
- 243. Windsor, Jane. Cooperative Extension Service, University of Alaska. Interview. October 1977.

Audio-Visual Materials

- 244. Alaska State Library - Anchorage. "Video Tape Programs Available from the Alaska State Film Library in Anchorage." Mimeographed. August 25, 1976.
- 245. Alaska State Library. Alaska State Film Library. Juneau, Alaska. 1975 Catalog.
- 246. Alaska State Library. "Alaska State Film Library 1976 Supplement" Mimeographed. Juneau, Alaska. 1976.
- 247. Curriculum Service Center, Media Catalog. Fairbanks North Star Borough School District. Fairbanks, Alaska. 1977.
- 248. Airways to Learning. Film 02276. Alaska State Library, Juneau and Anchorage.
- 249. Alaska: America's Northern Frontier. Film 1020. Alaska State Library, Juneau and Anchorage.
- 250. Alaska: End of the Last Frontier. Film 1703. Alaska State Library, Juneau and Anchorage.
- 251. Alaska, the 49th State, Film. Fairbanks North Star Borough.
- 252. American Insights: the Space Age: Goddard to Appollo. Film 1740. Alaska State Library.
- 253. Choosing Alaska's Communications Future. Video Tape. Office of Telecommunications. March 1977.
- 254. Earth's Satellites-Explorers of Outer Space. Film 206. Alaska State Library.
- 255. Education and Satellites in Alaska. Video Tape. National Institute of Education Product #2. Alaska Department of Education.
- 256. Education and Telecommunication in Alaska. Video Tape. National Institute of Education Product #1. Alaska Department of Education.
- 257. Education in Eskimo. Film. Fairbanks North Star Borough.
- 258. Just Around the Corner. Film. Radio Corporation of America Alascom.

- 259. Principles of Orbit. Film 02257. Alaska State Library.
- 260. RCA Alascom Puppet Show. Public Relations Department. RCA, Anchorage.
- 261. Satellite House Call. Film 06012. Alaska State Library. Juneau and Anchorage.
- 262. Schools of Alaska. Film 06043. Alaska State Library. Juneau and Anchorage.
- 263. Space Science, An introduction. Film 01902. Alaska State Library. Juneau and Anchorage.
- 264. Space Science for Beginners. Film 04726. Alaska State Library. Juneau and Anchorage.
- 265. Space Science: Man-Made Satellites. Film 04725. Alaska State Library. Juneau and Anchorage.
- 266. Stepping Stones in Space. Film 1178. Alaska State Library. Juneau and Anchorage.